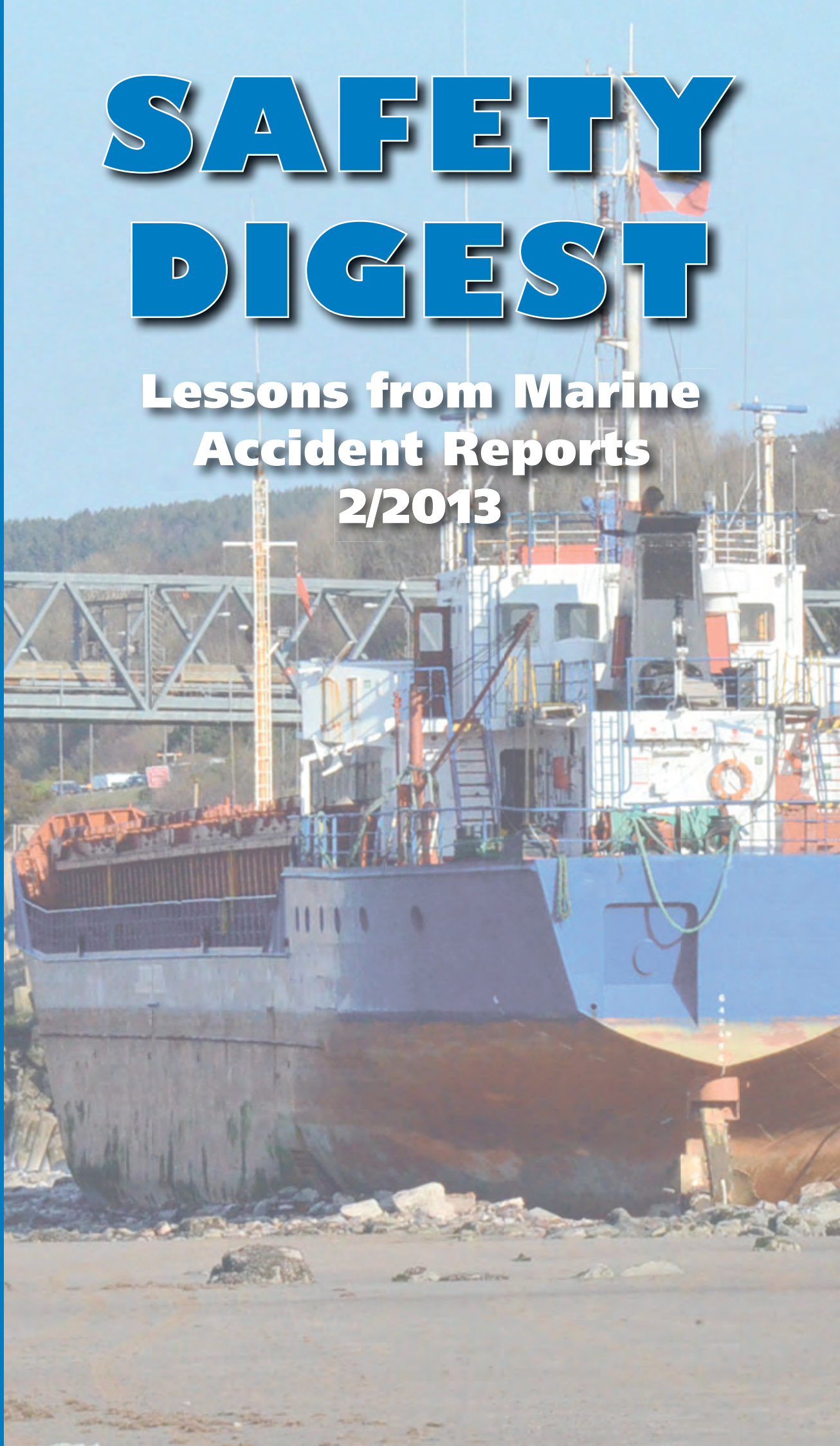
MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports 2/2013



MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accidents

No 2/2013

MAIB is an

INVESTOR IN PEOPLE

This publication can also be found on our website: www.maib.gov.uk

October 2013

MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) examines and investigates all types of marine accidents to or on board UK vessels worldwide, and other vessels in UK territorial waters.

Located in offices in Southampton, the MAIB is a separate, independent branch within the Department for Transport (DfT). The head of the MAIB, the Chief Inspector of Marine Accidents, reports directly to the Secretary of State for Transport.

This Safety Digest draws the attention of the marine community to some of the lessons arising from investigations into recent accidents and incidents. It contains information which has been determined up to the time of issue.

This information is published to inform the shipping and fishing industries, the pleasure craft community and the public of the general circumstances of marine accidents and to draw out the lessons to be learned. The sole purpose of the *Safety Digest* is to prevent similar accidents happening again. The content must necessarily be regarded as tentative and subject to alteration or correction if additional evidence becomes available. The articles do not assign fault or blame nor do they determine liability. The lessons often extend beyond the events of the incidents themselves to ensure the maximum value can be achieved.

The Editor, Jan Hawes, welcomes any comments or suggestions regarding this issue.

If you do not currently subscribe to the Safety Digest but would like to receive an email alert about this, or other MAIB publications, please get in touch with us:

- By email at maibpublications@dft.gsi.gov.uk;
- By telephone on 023 8039 5500; or
- By post at: Publications, MAIB, Mountbatten House, Grosvenor Square, Southampton, SO15 2JU

If you wish to report an accident or incident
please call our 24 hour reporting line
023 8023 2527

The telephone number for general use is 023 8039 5500.

The Branch fax number is 023 8023 2459
The e-mail address is **maib@dft.gov.uk**

Summaries (pre 1997), and Safety Digests are available on the Internet:
www.maib.gov.uk

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

The role of the MAIB is to contribute to safety at sea by determining the causes and circumstances of marine accidents and, working with others, to reduce the likelihood of such causes and circumstances recurring in the future.

Extract from
The Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2012 – Regulation 5:

"The sole objective of the investigation of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

INDEX

Glossary of Terms and Abbreviations

AIS	-	Automatic Identification System
C	-	Celsius
CO_2	-	Carbon Dioxide
COLREGS	-	International Regulations for the Prevention of Collisions at Sea 1972 (as amended)
COSWP	-	Code of Safe Working Practices for Merchant Seamen
CPP	-	Controllable Pitch Propeller
DSC	-	Digital Selective Calling
ECR	-	Engine Control Room
EPIRB	-	Emergency Position Indicating Radio Beacon
FRC	-	Fast Rescue Craft
GM	-	Metacentric Height
GZ	-	The righting lever that acts on a vessel to restore equilibrium when inclined by an external force
HSC	-	High Speed Catamaran
kg	-	kilogram
m	-	metre
“Mayday”	-	The international distress signal (spoken)
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MOB	-	Man Overboard
OMD	-	Oil Mist Detector
OOW	-	Officer of the Watch
PFD	-	Personal Flotation Device
RIB	-	Rigid Inflatable Boat
Ro-Ro	-	Roll on, Roll off
SAR	-	Search and Rescue
TSS	-	Traffic Separation Scheme
VHF	-	Very High Frequency
VTS	-	Vessel Traffic Services

Introduction

In reviewing the merchant vessel section of this edition of the Safety Digest I was struck by the number of cases where communications (or rather the lack of effective communication between departments and individuals) have been causal. We have perhaps become used to reading about cases where the inability of the deck department to share information has led to accidents (Cases 14 and 15). However, engine room staff can also sometimes be guilty of not appreciating the wider consequences of a developing problem. Cases 2 and 3 provide examples of what can happen when there is a failure to communicate, either between the engine room and the bridge, or within the engine room team itself.

Proper planning is integral to effective communication when executing a voyage or conducting other potentially hazardous operations. When developing a plan, the prudent mariner should always be alert to the possibility that changes to the prevailing circumstances may require it to be kept under review and/or contingencies developed. By asking yourself "what if?" and "what are the risks?" at every stage you are more likely to be able to anticipate, and prevent potential threats to the safety of everyone concerned. For example, tidal conditions may alter (Case 11) or be unexpectedly strong (Case 6); the traffic situation when approaching an alteration of course might require the plan to be adjusted (Case 4). Ultimately, blind adherence to a plan that is flawed or inflexible can be as dangerous as having no plan at all (Cases 10 and 13).

The importance of planning and anticipation is again highlighted in the fishing vessel section (Cases 17 and 21) while Cases 18, 19 and 20 identify the need for fishermen to conduct realistic safety drills on board their vessels. Other perennial issues, such as inadequate testing of alarms, the need to wear personal flotation devices when working on deck, and the challenges faced by fishermen when trying to recover colleagues who have fallen overboard, all feature in this section.

In the small craft section, I make no apology for the graphic photo of an injury sustained by a member of the public (Case 25). It serves as a reminder that hire companies need to ensure that their customers are provided with thorough briefings (including demonstrations of the operation of any bespoke or unusual equipment) before handing over their craft to someone who may have little or no experience of boating.

The potential consequence of not using a kill cord is demonstrated in Case 23. Sadly, the recent tragic accident that befell a young family while manoeuvring a RHIB at speed in the Camel Estuary provided a more harrowing example of why kill cords must be used when fitted. This accident prompted the publication of MAIB Safety Bulletin 1/2013 which is included at Appendix C. Since the accident, a lot of work has been done by organisations such as the RYA and the RNLI to promote the use of kill cords. If your boat is fitted with this device please, please make sure the cord is always securely attached to the driver whenever the engine is switched on.

Until next time, keep safe

Steve Clinch

Steve Clinch
Chief Inspector of Marine Accidents
October 2013

Part 1 - Merchant Vessels

The famous historian Livy once wrote

"To err is human indeed it is the cause of most of our misery. Invariably though it is to the Gods that we look for remedy"

How true, although as insurers in today's world we might refine it a bit to read

"***Human Error*** is the cause of most of our misery. Invariably though it is to the ***P&I Clubs*** that we look for ***reimbursement***"

This is why we must applaud and support efforts like this of the MAIB to highlight and raise awareness of current issues in our industry. We can't manage what we can't measure, so it is imperative that hard facts such as these are recorded and made available for industry to act on so as to help prevent future accidents and reduce claims.

In the following incidents it can be seen that whilst humans "err" they also "violate", we as insurers see this, on a daily basis in the claims we handle. The important distinction between the two being that each have different mental origins, occur at different levels of the organisation, require different counter measures and have different consequences. Everyone in an organisation, from members of the Board to those at the coal face, bears some responsibility for the commission of violations. It therefore follows that **ALL** employees have a part to play in minimising their occurrence, not just those on the vessel.

Assuming that a safe operating procedure is well founded, any deviation will bring a violator into an area of increased risk and danger. The violation itself may not be damaging but the act of violating takes the violator into regions in which subsequent errors are much more likely to have bad outcomes.

It can sometimes be made much worse because persistent rule violators often assume, somewhat misguidedly, that nobody else will violate the rules, at least not at the same time! (The boy racer in his sports car overtaking on a bend never considers there may be another boy racer doing a similar thing on the other side of the bend!)

Violating safe working procedures is not just a question of recklessness or carelessness by those at the coal face. Factors leading to deliberate non compliance extend well beyond the psychology of the individual in direct contact with working hazards. They include organisational issues (latent failures) such as:

- The nature of the workplace
- The quality of tools and equipment
- Whether or not supervisors or managers turn a "blind eye" in order to get the job done
- The quality of the rules, regulations and procedures
- The organisation's overall safety culture or lack of it.

Violations are usually deliberate, but can also be unintended or even unknowing. They can also be mistaken in that deliberate violations may bring about consequences other than those intended, as at Chernobyl. In that case, out of seven unsafe acts leading up to the explosion six were a combination of a rule violation and an error. Here was a sad and remarkable case in which a group of well motivated and exceedingly expert operators destroyed an elderly but relatively well defended reactor without the assistance of any technical failures.

As insurers we frequently see incidents caused by what we call **"Routine violations"** often defined by the phrase - "we do it like this all the time and nobody notices" **"Optimising violations"** corner cutting, i.e. following the path of least resistance. **"Situational violations"** standard problems that are not covered in the procedures i.e. "we can't do this any other way". **"Exceptional violations"** unforeseen and undefined situations i.e. a crew man entering an enclosed space to help rescue a collapsed colleague, gut impulse frequently stronger than dictates of training and common sense.

Were human errors/violations the cause of any of the following incidents? Few of us in the marine industry are experts on human nature, least of all us as insurers. I wonder if we put ourselves in some of the following situations and ask ourselves honestly what would we have done, would we have violated. I wonder, perhaps Mark Twain was right, none of us is perfect !!!!

"Man is a creature made at the end of the week when God was tired"

Mark Twain

Karl Lumbers

Karl Lumbers is the Risk Management Director for Thomas Miller P&I Ltd, managers of the UK P&I Club, one of the world's largest liability insurers, insuring over 200 million tonnes of owned and chartered blue water shipping. Karl is a Master Mariner having served at sea with P&O until the early 80's when he came ashore to join London based marine consultants Cleghorn Wilton & Associates. In 1985 after running their Dubai office, he returned to London to join Thomas Miller P&I Ltd managers of the UK P&I Club where he is now a member of their Global Management Team responsible for monitoring the quality of the ships in the Club, analysis of the claims they produce and the surveyors/consultants used in investigating those claims. He is also responsible for the risk management work carried out by the Club in trying to assist Members in reducing their claims.

Karl is a Fellow and past Council Member of the Nautical Institute, a member of the IACS Advisory Committee, Lloyds Register General and Classing committees, American Bureau of Shipping and Korean Register of Shipping European committees and a member of the Honourable Company of Shipwrights.

Alcohol-assisted Collision

Narrative

A small outbound general cargo vessel and a large inbound ferry collided near the fairway buoy that marked the seaward limit of a port. Fortunately, there were no resulting injuries or pollution and both vessels managed to proceed into port under their own power. However, the cargo vessel's bow was extensively damaged (Figure 1) and the collision caused a large gash in the ferry's port side (Figure 2).

It was shortly after sunset, the weather was fine and the visibility was good. Each vessel had operational radar, each had contacted the port's VTS at the required reporting points, and there was no other traffic in the vicinity.

The cargo vessel's master was alone on the bridge as the vessel approached the fairway buoy. On the ferry, the master had temporarily left the bridge, leaving the chief officer (who was also a pilotage exemption certificate holder for the port) with the con. The third officer and a helmsman were also in attendance.

As the ferry approached the fairway buoy, the chief officer was content to close the cargo vessel because, in his experience, vessels departing the port routinely altered course to starboard after passing the fairway buoy.

The cargo vessel left the fairway buoy to port. However, instead of then altering course to starboard, her master chose to alter course to port, which put the cargo vessel on a collision course with the ferry.

Figure 1: Damage sustained to the general cargo vessel

Figure 2: Damage sustained to the ferry

The VTS operator had called the cargo vessel on VHF radio and had questioned the master's intentions. On receiving confirmation from the master that he was altering course to port, the VTS operator then called the ferry, informing the chief officer that the ferry was standing into danger with the cargo vessel, and requesting him to contact the cargo vessel directly.

The chief officer followed the VTS operator's advice and tried to make contact with the cargo vessel. Meanwhile, the third officer, who had seen the cargo vessel altering course to port, informed the chief officer of the fact and repeatedly advised him of the danger of collision. The chief officer then ordered hard to starboard and called the master back to the bridge. However, this action was too late to prevent the vessels colliding.

Once the vessels were alongside, local police officers boarded each of them and breathalysed the deck officers. The cargo vessel's master was found to be more than three times over the legal limit for alcohol. He was later convicted for breaching the Railways and Transport Safety Act 2003 and sentenced to 1 year's imprisonment.

The Lessons

1. Don't drink and drive! It is totally unacceptable to be in charge of a navigational watch while intoxicated. In this case, the cargo vessel's master received a prison sentence for his reckless behaviour.

2. The ferry's chief officer assumed that the cargo vessel would alter course to starboard after passing the fairway buoy. When this did not happen, he should have been in little doubt that a risk of collision existed. The ferry was a stand-on vessel in a crossing situation and the chief officer was at liberty to take avoiding action by his manoeuvre alone. However, he delayed doing so and continued towards the fairway buoy on the assumption that the cargo vessel would eventually take action to avoid a collision.

   Such complacency is very dangerous. In this case, the outbound vessel was under the charge of an inebriated master who decided irrationally to alter course to port. However, the vessel could equally have suffered a steering failure leading to a similar result.

   When approaching another vessel at close-quarters, an OOW should always have the 'what if?' scenario playing in their mind, so that he or she is prepared to act, and does act, should the need arise.

3. Although the ferry's third officer informed the chief officer that the cargo vessel was altering course to port, the chief officer continued to delay taking avoiding action. Given the close proximity of the cargo vessel and the ferry's manoeuvring characteristics, his decision to delay indicates that he did not appreciate the time available in which he had to act before collision became inevitable. How well do you know your own vessel's manoeuvring characteristics? Would you know when to act?

   A further contributing factor is likely to have been the chief officer's distraction in choosing to respond to the VTS operator's VHF radio call and then attempting to communicate with the cargo vessel. This was contrary to the advice provided in MGN 324(M+F), which states: *"Valuable time can be wasted whilst mariners on vessels approaching each other try to make contact on VHF radio instead of complying with the Collision Regulations"*.

4. The VTS operator quickly identified that the cargo vessel, on passing the fairway buoy, had not altered course to starboard as he had expected. He did not hesitate to question the master's intentions, confirm his action and convey this to the ferry. However, short and sharp warning messages, in accordance with best practice, would have been more effective in conveying the urgency of the situation to both vessels.

   The VTS operator then requested the ferry to make radio contact with the cargo vessel directly; a request that the chief officer followed. This distracted him and possibly delayed him from taking avoiding action.

No Air, No Clutch, No CPP, No Brakes

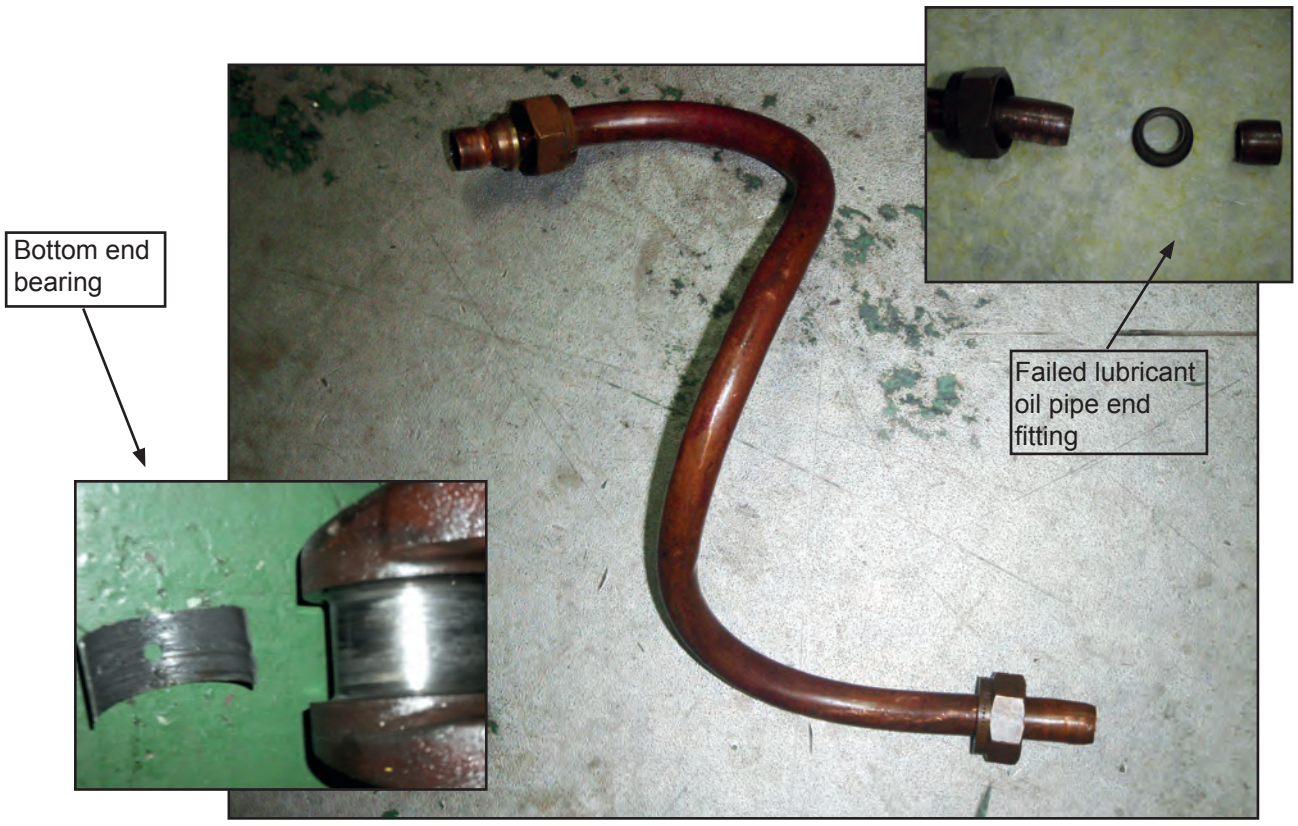
Narrative

During passage, the duty engineer on board a ro-ro passenger ferry noticed an oily mist surrounding one of two air compressors (No1). The compressor in question was supplying control air to the vessel's main engine clutches. The engineer changed over the supply of control air to a second compressor (No2) and reported his actions to the senior engineer in the ECR. Immediate investigation identified that the main lubricating oil discharge pipe assembly in No1 compressor had detached, and that the bottom end bearing had overheated and failed (see figure). No1 compressor was isolated but the engineers soon noticed that the air pressure in the main air receiver was dropping.

Shortly afterwards, the centre main engine was started and all three main engines were put on standby in preparation for entering port.

During this period, multiple alarms sounded in the ECR warning of low control air pressure. In response, two engineers searched the engine room for a possible air leak. The senior engineer in the ECR telephoned the bridge and informed the OOW that there was a problem with the compressed air supply and that there was a possibility that the three main engine's clutches may disengage.

The master prompted the OOW to request that the engineers let him know when they had more information. As the ferry was now within a buoyed channel, 1 mile off the port entrance, and had passed the planned 'abort' position, the master decided to continue the entry into the port as intended. The approach went according to plan until the ferry was about 1½ ships' length from its final berthing position, when her three main engine clutches disengaged almost simultaneously.



Damage to lubrication oil pipe and bottom end bearing

CASE 2

In the engine room, the reserve compressed air cylinder was opened but there was still insufficient air pressure to re-engage the clutches. Although the starboard anchor was let go in an attempt to reduce the speed of approach, this did not prevent the ferry's bow hitting her berth at a speed of 2.5kts and causing minor damage.

Shortly after the impact, the engineers successfully re-engaged the port main engine clutch and the vessel was able to berth safely alongside, assisted by harbour tugs. Subsequent investigation identified that No2 compressor had a damaged discharge valve. Neither compressor had been able to keep up with demand.

The Lessons

1. **When starting machinery or when putting machinery on line or on load, it is good engineering practice to check that it is operating correctly. Assumptions often lead to unwanted surprises.**

2. **When a machinery breakdown occurs in close proximity to navigational dangers and other vessels, its consequences could be catastrophic unless effective action is taken quickly. However, this is difficult to achieve where fault diagnosis is slow and the communications between the engine room department and the bridge are imprecise or vague. Such difficulties can usually be overcome by conducting realistic machinery drills. Although such drills are often difficult to programme, they are a very good investment which, if conducted properly, will probably save time and money in the long run.**

3. **Check cards can be a useful aid to fault diagnosis and rectification when things get hectic. However, in this case, the need to isolate the main air cylinder when the reserve air cylinder was brought on line was not included. Consequently, the air pressure equalised at a level that was insufficient to re-engage the main engine's clutches. Use check cards, but don't let them stop you from thinking on your feet as well.**

To Turn or Not to Turn?

Narrative

A specialist cargo ship was in port loading a dangerous cargo. As a precaution, the vessel's slow speed diesel main engine had been tested and was kept at a heightened state of readiness. This involved the fuel being shut off, the main engine indicator cocks being left open, the turning gear being disengaged, the air receiver valves and main air start valve being shut, and the lubricating and cooling water pumps left running. For 10 minutes every hour, the duty engineers turned the engine using the turning gear.

Once the loading had been completed, the notice for the main engine was extended to 4 hours. This was recorded in the engine movement log. When at 4 hours' notice, it was normal practice to leave the turning gear engaged. However, because the duty engineers intended to conduct tests on the main engine after lunch, they decided to leave the engine at the heightened state of readiness. However, they did not inform the chief engineer or the OOW on the bridge of their intentions. The turning gear remained disengaged.

After lunch, the bridge OOW gave the duty engineers permission to test the main engine. Although the main engine had not been turned for some time, the engineers decided to start it without first using the turning gear. Accordingly, the air start valves were opened and one of the engineers operated the turning gear control lever with the intention of disengaging the turning gear from the main engine flywheel. The turning gear was not marked in any way to show whether it was engaged or disengaged, and the operating instructions that were posted nearby had been painted over.

The engineer then went to the machinery control room to start the engine. Although the indicator for the turning gear, which was sited on the control panel, showed that the turning gear was in, this was poorly illuminated and was not seen by the engineer. When the main engine start button was pressed to turn the engine on compressed air, a loud bang was heard; the turning gear interlock, the last remaining safety barrier, had failed to work. The resulting damage to the shaft and gearing (Figure 1) and to the turning gear casing (Figure 2) disabled the ship for a month and cost a six-figure sum to repair.

Figure 1: Damage to gearing

Figure 2: Gearcase middle section crack

The Lessons

1. The turning gear interlock had not been included within the planned maintenance system on board and there was no record of it having been tested.

2. Control console illumination panels are vital to the safe operation of machinery and should therefore be tested regularly. If problems with visual indication or warning lamps cannot be rectified immediately, they must be reported. Living with the problem is not a solution.

3. It is important that the status of the main engine machinery conforms to the status recorded in the engine movement log and machinery state boards to enable everyone involved in an operation to maintain a clear understanding. If it does not, confusion can easily develop, and this inevitably increases the risk of damage to machinery and injury to persons.

4. Procedures are not implemented solely to enable a particular task to be completed; they are also intended to protect people, the equipment being operated, and the environment. Cutting corners is frequently dangerous - no matter how skilled or experienced an individual might be.

Ready or Not - I'm Crossing

Narrative

A 14,000gt cargo vessel was on a regular service that required her to routinely cross a TSS. Her passage plan required her to approach the south-west traffic lane on a course of 192°(T) and then cross the traffic lane at right angles.

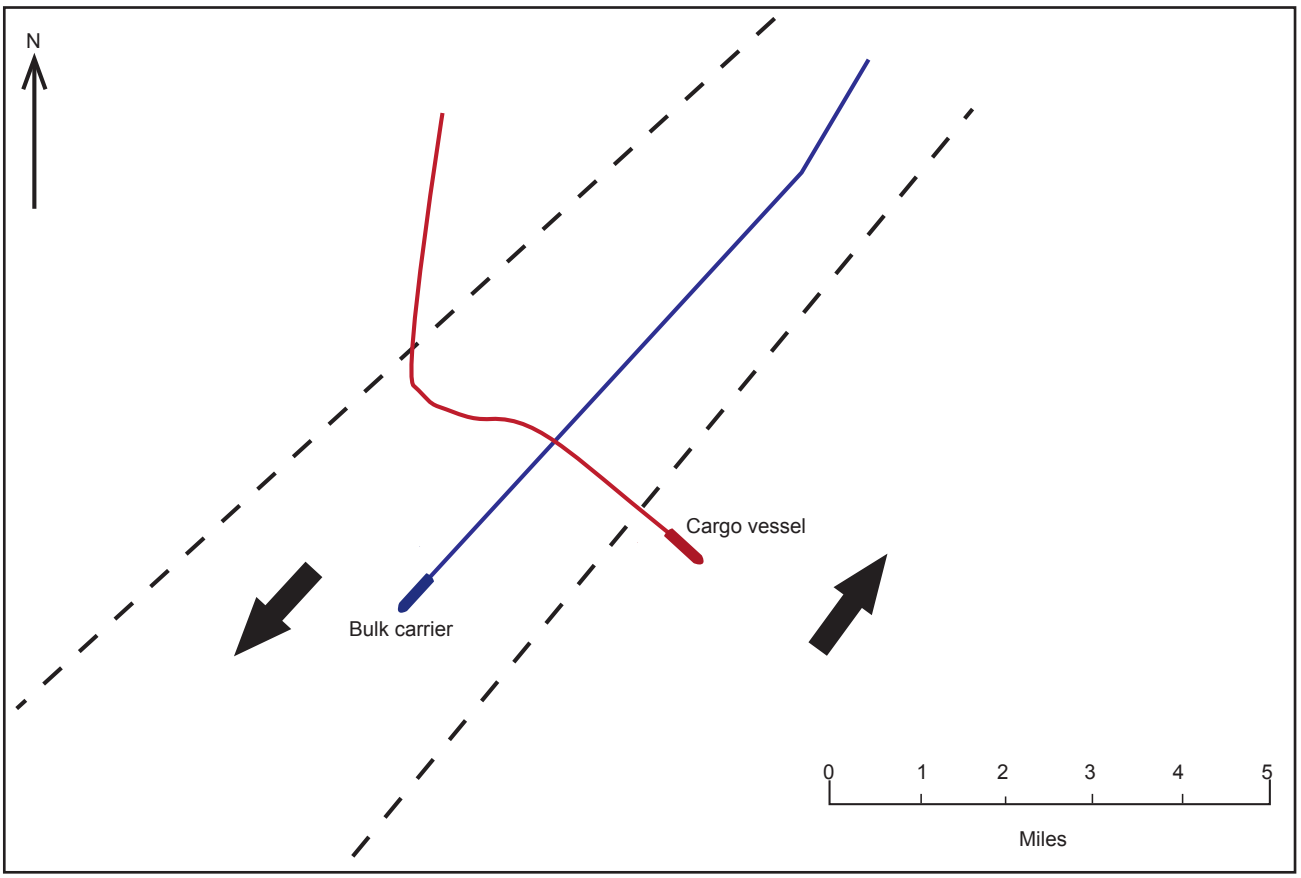
It was dark, the wind was south-west force 4 and the visibility was good. The second officer was in charge of the bridge watch with the master and a lookout in attendance. The vessel's speed over the ground was 9½ knots.

The second officer had been plotting the radar tracks of four vessels in the south-west lane, which he considered may be cause for concern once the cargo vessel reached the waypoint at the edge of the traffic lane. He briefed the master on his observations, concluding that one of the vessels, a bulk carrier, would be a problem once the cargo vessel had altered course to port to cross the lane.

The master assessed that if the cargo vessel altered course at the waypoint without significantly losing speed, she would pass safely ahead of three vessels and, if she continued to turn to port, would pass safely astern of the bulk carrier. He advised the second officer of his intentions and then took the con.

At the waypoint, the master ordered a slow alteration of course to port. During the turn, with the cargo vessel heading 125°(T) and the bulk carrier bearing 082°(T) at a range of 2.04 miles, the bulk carrier's OOW made several calls on VHF radio Channel 16 to clarify the cargo vessel's intentions. None was heard on board the cargo vessel.

The cargo vessel stopped turning on a heading of 093°(T) with the bulk carrier fine on her starboard bow at a range of 1.4 miles. She then slowly turned to starboard, keeping the bulk carrier on her starboard bow, and finally steadied on her planned course to cross the traffic lane.



Tracks of cargo vessel and bulk carrier

The Lessons

1. The cargo vessel's passage plan required the vessel to alter course by 60° at the edge of the south-west traffic lane. This left insufficient time for the manoeuvre to be carried out before the vessel entered the traffic lane, and very little time for vessels proceeding in the traffic lane to effectively assess the situation and take appropriate action.

   A waypoint located sufficiently outside the traffic lane would have enabled the cargo vessel to comply fully with Rule 10(c) of the COLREGS. It would also have enabled the bulk carrier to properly determine if a risk of collision existed in accordance with Rule 7(a) and, if so, to take early, substantial and appropriate action as a give-way vessel in accordance with Rules 15 and 16.

   Passage planning requires precautionary thought. Rule 2(a) warns against *"the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case"*. Precautionary thought declines with the onset of complacency, a recognised danger for vessels on a regular service.

2. The master's plan to continue turning to port to pass astern of the bulk carrier took no account of how the bulk carrier's OOW would interpret the manoeuvre. Effective collision avoidance requires an accurate perception of the circumstances, an understanding of the COLREGS and, importantly, a projection of the consequences of any decided action.

   It was fortunate that, on detecting the cargo vessel's alteration of course to port, the bulk carrier's OOW did not alter course to starboard in anticipation of the cargo vessel steadying on a course to cross the traffic lane at right angles. Such action would have been reasonable given the limited time available in which to act.

   A preferred plan would have been to slow down and to not attempt to cross the traffic lane until there was a sufficient gap in the traffic flow for the cargo vessel to proceed on her planned course without risk of collision. Such action would have been in accordance with Rule 8(e) of the COLREGS.

3. Uncertainty might have been avoided if the cargo vessel's master had effectively communicated his intended manoeuvre to the bulk carrier's OOW at a sufficiently early stage. However, MGN 324 (M+F) - Radio: Operational Guidance on the Use of VHF Radio and Automatic Identification Systems (AIS) at Sea - warns of the dangers of using VHF radio as a collision avoidance aid and the need to comply with the COLREGS.

   In this case, the cargo vessel's master made no attempt to convey his plan to the bulk carrier, and the VHF radio calls made by the bulk carrier's OOW were not received on board the cargo vessel owing to the speaker volume having been turned down. VHF radio transmissions are of no value unless they can be heard.

Mist-er Oil Filter

Narrative

A fully loaded cargo ship departed port and proceeded on her voyage. Several days into the passage, the oil mist detector (OMD) on the medium speed diesel main engine alarmed. The duty engineer investigated but could not find any fault with the engine. He reset the alarm and continued with his duties.

Several hours later, the OMD alarm activated again. The chief engineer was in the engine room and saw smoke vent from the main engine crankcase explosion relief doors. A lubricating oil low pressure alarm, and a lubricating oil low pressure trip alarm soon followed. The engine then shut down automatically. With propulsion lost, the master quickly anchored the vessel.

After the engine was allowed to cool, the crankcase doors were removed; several crankshaft bearings were severely damaged (Figure 1) which prevented the engine from further operation. The vessel was towed to the nearest available port for further assessment.

Subsequent investigation by the engine manufacturer determined that the damage included: the failure of all crankshaft main and crankpin bearings; the displacement of all the crankshaft main bearing shells; scoring of the crankpin and main bearing journals; overheating of crankpin and main bearing journals; overheating of the bedplate at the main bearing housings; overheating of the piston connecting rods; the seizure of several pistons (Figure 2); failure of the camshaft and turbo charger bearings, and metallic debris throughout the lubricating oil system. The damage sustained necessitated an engine rebuild and the replacement of the bedplate and crankshaft.

A month before the engine failure, a fault on the engine's lubricating oil pumps required the replenishment of the oil charge and replacement of the oil filters. The engine was equipped with a duplex lubricating oil filter which housed two paper filter cartridges. The filter was manually operated with one filter in operation at a time. A differential pressure gauge and alarm provided indication for when the changeover and replacement of the filters was required.

The repairs were carried out by contractors under the supervision of the engine manufacturer's service agents and the vessel's classification society, and the vessel returned to service. Up until the engine failure the engine appeared to operate without any problems and the vessel undertook several voyages. However, after the engine failure, the duplex filter was found without a filter cartridge in the on-line filter chamber, and the engine lubricating oil system was contaminated. The contamination caused main bearing seizure, the rotation of bearing shells and the blockage of oil ways, and subsequent oil starvation and overheating to other bearings and to the pistons.

The engine daily logs referred to oil filter cartridge changes only prior to the repair to the oil pumps. They also showed that the pressure reading on the differential pressure gauge for the on-line oil filter remained low, indicating that the filter did not require changing.

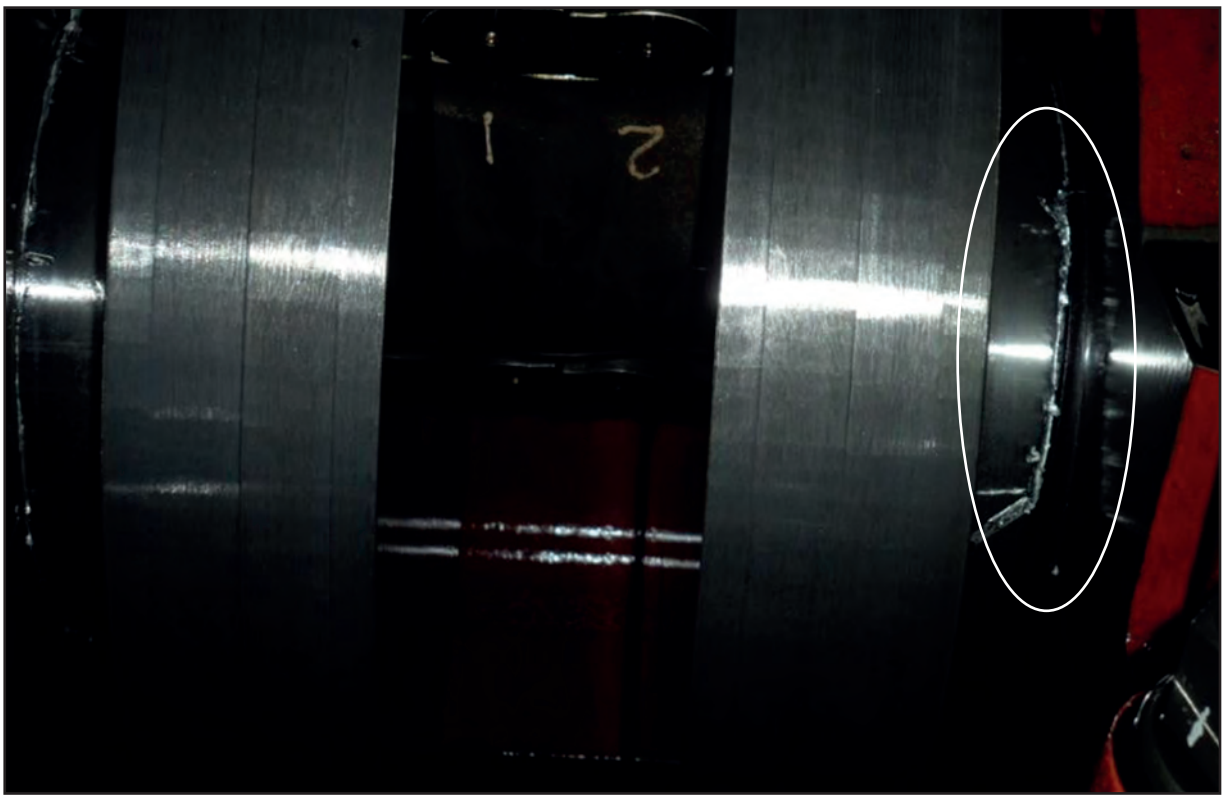


Figure 1: Damage to crankshaft bearings

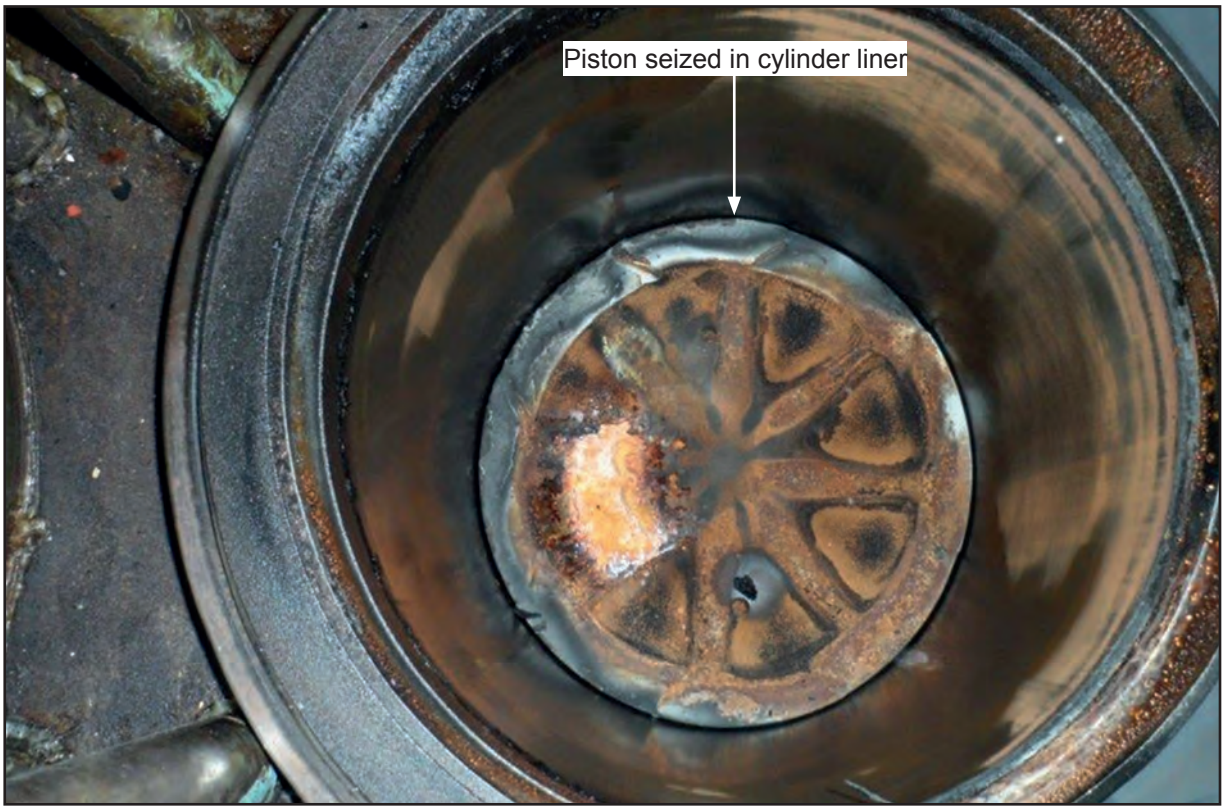


Figure 2: Seized piston

The Lessons

1. Maintenance periods can be busy times; however it is imperative that ships' staff maintain sufficient oversight of work undertaken by contractors to ensure that critical steps are not overlooked.

2. One of the advantages of completing daily logs is the ability to assess trends in the operating machinery. A consistently low reading on the filter differential oil pressure gauge, and a comparison with previous operating hours between filter changes, should have rung alarm bells that something was wrong.

3. An oil mist detector gives advance warning of an impending major failure. When a detector alarm occurs, the thought of stopping and inspecting the engine as soon as possible should be uppermost in an engineer's mind. The consequences of ignoring it are clear, and expensive.

Port Helm, Starboard Turn

Narrative

A container vessel was about to depart. She was berthed port side to, facing downstream, alongside a river terminal. It was daylight, a force 4 wind was on the vessel's starboard quarter and the tidal stream was flooding at a rate of about 2 knots. The bridge was manned by the master, chief officer and a helmsman, and a pilot was on board.

The master and pilot exchanged information on the vessel's status and briefly discussed the planned departure manoeuvre. A tug was made fast on the vessel's starboard quarter and the mooring lines were then singled up. Having received permission from VTS for the vessel to proceed, the pilot gave instructions for the mooring lines to be let go. He then ordered the tug to pull the vessel's stern off the berth and operated the bow thruster to move the bow to starboard. Once the vessel was clear of the berth, the engine was put ahead and the tug was let go. The vessel then started to cross the river towards the starboard side of the main channel.

Shortly afterwards, the pilot ordered the helm to 'port 20°' with the intention of turning the vessel to stem the tidal stream. However, the bow unexpectedly payed off to starboard. The pilot then ordered 'hard-a-port' but the bow continued to pay off to starboard. The master then intervened and, with the pilot's agreement, the engine was put to 'full astern'.

Although the vessel's engine developed full astern power, this was insufficient to arrest her headway in the space available and she made heavy contact with the quay on the opposite bank of the river (see figure). Fortunately, no one was hurt and there was no pollution. However, the vessel's bow suffered significant damage.

Contact with the quay

The Lessons

As the vessel's bow entered the main flood tidal stream, her stern remained in a counter-flow. This, together with the wind acting on her starboard quarter, caused a coupling effect, which resulted in the vessel unexpectedly turning to starboard.

The near-reciprocal nature of the vessel's heading and the direction of the flood tidal stream meant that a small change in the lateral position of the vessel and/or edge of the tidal stream could make a significant difference to the point at which the vessel's bow entered the tidal stream. The margin for error in achieving the intended manoeuvre was small, and the pilot had unintentionally not applied port helm until after the vessel's bow had entered the flood tidal stream.

1. The accident might have been prevented had the pilot retained the option of using the tug for longer, as he could have used it to assist the vessel to turn into the flood tidal stream. Alternatively, he could have used the tug to pull the vessel off the berth while applying starboard thrust until the vessel had laterally entered the flood tidal stream. This latter option would have ensured that the master and pilot maintained control of the vessel until she had fully entered the flood tidal stream and was in a safe position to start making way ahead.

2. The master and pilot did not conduct a detailed exchange of information. Had they discussed areas of the river transit that might have posed a risk, they might have decided to retain the use of the tug until the vessel was clear of the complex tidal flows in the vicinity of the terminal.

Honestly Chief, It Just Fell Off

Narrative

A small cargo vessel was at a lay-by berth preparing to load general ship's stores. The crew were mustered to help and the bosun swung the provisions crane (Figure 1) outboard ready to unload stores from the agent's van. The provisions crane was a gantry type, similar to those often seen in engine rooms. The bosun began to drive the trolley outboard ready to pick up the first load.

A crewman watched as one side of the trolley appeared to 'climb up' one side of the gantry 'I' beam. Before he could shout a warning, the trolley, weighing over 400kg, twisted off the gantry and fell about 7.5m, landing on the ship's guardrail (Figure 2).

Luckily, none of the seven people who were standing nearby were injured. Even though they were wearing hard hats, the impact would have caused serious - and quite possibly fatal - injuries.

Investigation after the accident found that, despite the ship's manager's very pro-active approach to maintenance and a strong safety culture, the provisions crane trolley had been left out of the planned maintenance regime. The trolley was difficult to get to and impossible to inspect or maintain without putting up scaffolding or using a man-carrying basket. As a consequence, the trolley wheels had seized up and flat spots had been worn where the wheels had been dragged along the 'I' beam.

The trolley had been built in such a way that once the wheels on one side climbed onto the lower flange of the 'I' beam, the opposite wheels could drop off the other side of the beam. The trolley was then able to fall away. The reason the wheels were able to climb onto the lower flange of the 'I' beam was due to a combination of:

- The trolley being naturally unbalanced by the motor being offset to one side.
- The driving gear which moved the trolley along the beam being at one corner only, and creating a twisting moment, and
- The increased drag from the seized wheels.

This accident is one of many reported to the MAIB that involve lucky escapes when cranes and lifting equipment fail. Extra vigilance is needed to make sure that the next accident does not have fatal consequences.

Figure 1: Stores crane

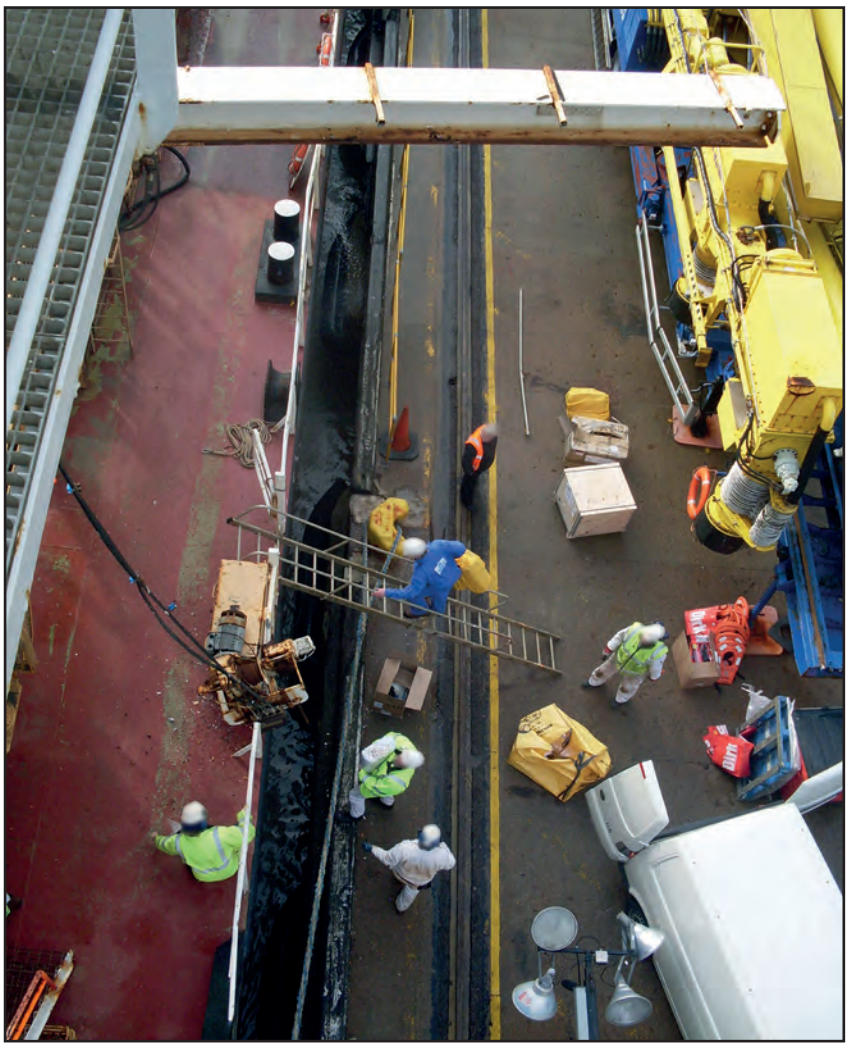


Figure 2: Main jetty shortly after the accident

The Lessons

1. Check that planned maintenance and inspections cover all parts of the equipment, and arrange proper access to enable components that are sited in awkward positions to be reached.

2. If there are no manufacturer's maintenance instructions, or if they are poor, seek expert help to ensure that the correct maintenance is being carried out.

3. Check that all non-cargo lifting appliances on board have been identified and recorded in accordance with national regulations. Some may be used only infrequently, to rig other equipment, and may not be obvious at first glance.

4. Make sure that those carrying out statutory inspections, load tests and thorough examinations are competent to do so. Employing contractors who meet a recognised industry standard should provide greater quality assurance.

5. Follow the guidance on lifting equipment published by the MCA in Marine Guidance Notes 331 and 332 and in the Code of Safe Working Practices.

6. Ensure that all key shipboard activities are identified, risk assessed and that the control measures identified, such as procedures, alarms and interlocks, are provided.

Don't Spoil the Party

Narrative

A company had hired a class V passenger vessel to host a thank-you party for its employees. The employees enjoyed their evening as the vessel cruised, the bar was open and everyone was having a great time.

At the end of the evening, the skipper brought the vessel back alongside a pier for the passengers to disembark. The mate stepped ashore, secured one mooring line at the bow and stood by the railings to help the passengers as necessary. The skipper left the wheelhouse and started clearing up after the party.

Several passengers disembarked via the foredeck, some went home and others waited on the pier for their friends. The tide was turning and the stern of the vessel started to drift away, opening up a gap between it and the pier. After a short while, the mate returned onto the boat and up to the wheelhouse. He brought the stern back into the pier and then went back ashore to secure two more lines before returning to the wheelhouse once more to reduce power.

Passengers had continued to disembark throughout this manoeuvre and a crowd had gathered both on the foredeck and the pier. As the stern came into the pier, the bow started to lift off, taking up the slack in the mooring lines. Closed circuit television recorded that, as one passenger stepped off the foredeck, he fell into the water before reaching the pier. In the crowd, only those who had been immediately next to him had seen what happened, and they raised the alarm as best they could.

It was dark and there was little background light from the pier and the accommodation. There was no trace of the passenger in the water, although several more people leaned over the railings in their attempts to find (and potentially rescue) him. The mate and skipper became aware of the commotion and called the emergency services. A lifeboat was on exercise nearby and was on-scene quickly. Wanting to give them room to search, the skipper of the passenger vessel pulled off the berth and started to search further off the pier. Passengers were still straining to see the man in the water, and the gate in the guardrails continued to remain open.

Despite extensive searches, the passenger could not be seen and his body was recovered several days later.

The passenger vessel

The Lessons

1. Never secure a vessel with a single mooring line and then leave the controls unattended. Any number of things could go wrong, endangering the safety of passengers, crew and the vessel itself.

2. If you have to adjust moorings, stop passengers from disembarking until the vessel has been re-secured.

3. Most people like a party, particularly if someone else is paying. Anyone who has enjoyed an alcoholic drink will be less able to look after themselves and so it is vital, especially on vessels that make a living out of hosting parties, that all the crew are on hand to see the passengers ashore safely and respond to any problems.

4. If something does go wrong, do not make it worse. In this case, despite the skipper's best intentions, his actions risked running over the passenger in the water and, potentially, risking other passengers falling overboard because the gate in the guardrail had not been closed.

5. Neither the skipper nor mate wanted the evening to end like this, yet both stood trial for criminal charges. The mate served a custodial sentence.

Ramming Home the Point - Distraction Causes Accidents

Narrative

At twilight on a clear autumn evening a high speed passenger catamaran, operating a scheduled service on a major English river, made heavy contact with a pier while berthing. As a result, 14 passengers and 2 crew members were injured and the vessel sustained damage to one of her hulls (Figure 1).

Earlier in the day the master had reported there was a defect with the vessel's steering control joystick, which was sometimes sticking hard over to port or starboard when released, instead of springing back to its normal central position (Figure 2).

A shore-based engineer inspected the unit and informed the master that a replacement would be fitted as soon as possible. The master decided that the vessel could remain in service by using the secondary, wheel steering system to control the rudders.

One of the mate's designated roles, in addition to handling the mooring of the vessel, was to monitor passenger embarkation and enter the figures into the vessel's log and onto a computerised data-link system. However, it had become regular practice for the mate to remain on the main deck and tell the master in the wheelhouse the figures so that the latter could log the data.

As the vessel left a pier on the opposite side of the river for one a short distance away, the master increased the vessel's speed to 12 knots, the maximum permitted for the area. The vessel was still making this speed when only 100m from the next pier. During the passage the master, who was alone in the wheelhouse, logged and entered the passenger figures into the data-link system, which resulted in him being distracted during a considerable part of the short passage (Figure 3).

The master had reverted to occasionally using the defective steering control joystick, which was located closer to the data-link computer than the main wheel. When the vessel was about 80m from the pier and making more than 10 knots, she suddenly veered to port when the steering joystick became stuck in the hard-a-port position. The master unsuccessfully attempted to steer the vessel, initially by using the joystick and then with the wheel. As this was having little effect he pulled the starboard engine controls back to stop and into astern, but he did this too quickly, and it resulted in the engine stalling.

The vessel continued towards the pier, and the master appeared to lose situational awareness when contact was imminent. The vessel was making about 8 knots, with the port engine still running ahead, when contact occurred. Many of the passengers were thrown forward, some hit their heads and faces on projections and the hard edges of the seat backs in front of them. A passenger in a wheelchair, who had been positioned away from the recognised wheel-chair area, suffered deep cuts to his face when thrown against a fire alarm call point.

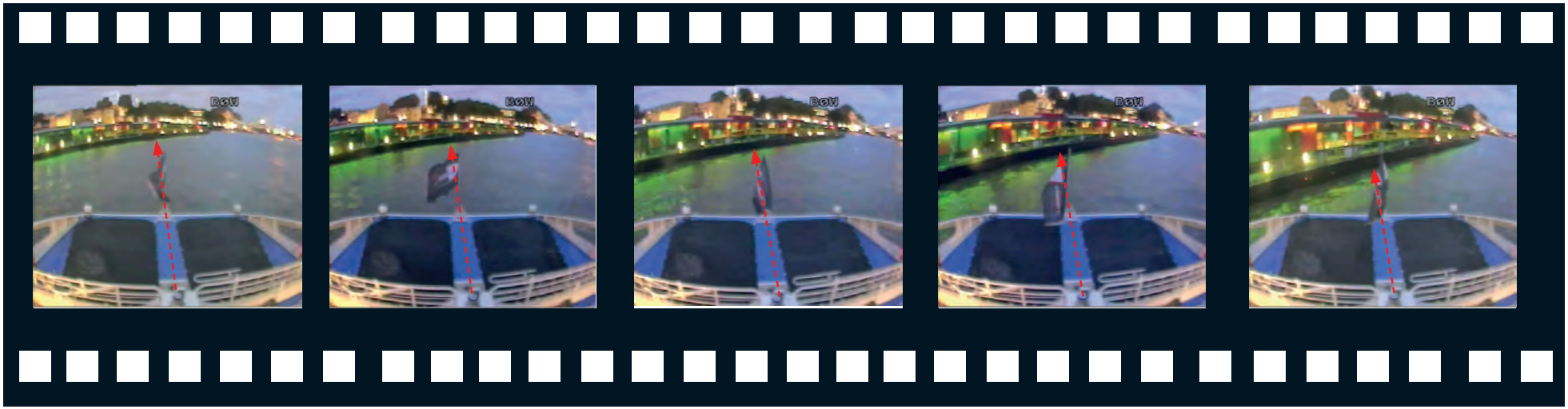
Following the contact, no announcements were made to the passengers regarding the accident. The crew appeared overloaded, the master remained in the wheelhouse liaising with shore authorities, and the mate was making the vessel fast. Meanwhile, the other crew member, who had been thrown to the deck by the contact, struggled to maintain order. Their ability to provide information, render first-aid to the injured passengers and control those who were uninjured was accordingly compromised.

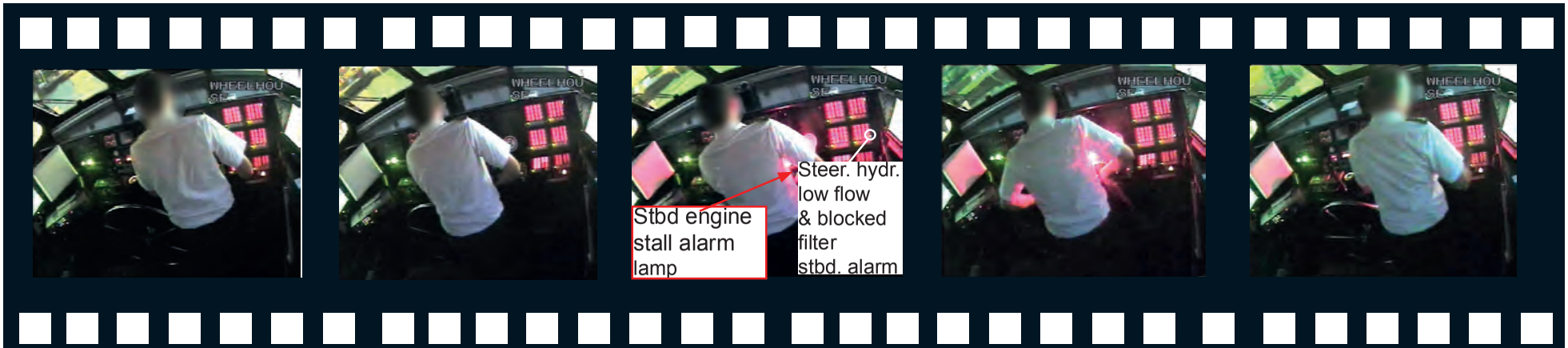
The emergency services attended promptly after the accident and all the passengers were then disembarked. The vessel was taken out of service and was given approval to proceed, at slow speed, to her base for repairs before returning to service a few weeks later.

Figure 1: Hull damage caused by contact

Figure 2: Showing wheel steering and steering control joystick system

Figure 3: Vessel's passage leading to contact with the pier





11 seconds to contact:

The master put the joystick to starboard and looked towards the rudder angle indicators.

9 seconds to contact:

The master looked forward and put the starboard control lever to full astern.

7 seconds to contact:

The starboard main engine stalled and the starboard steering system hydraulic low pressure alarm activated.

5 seconds to contact:

The master attempted to steer to starboard using the handwheel.

3 seconds to contact:

The vessel making 8 to 8.5 knots over the ground.

The Lessons

1. Mariners must guard against becoming distracted when they have the con of a vessel.

2. Owners should have systems in place to ensure that defects to safety critical systems are rectified as a matter of urgency.

3. Owners of passenger vessels, particularly high speed craft, should ensure that sharp edges and projections are well protected and that wheelchair users are located only in approved areas when the vessel is manoeuvring.

4. Owners should ensure that their vessels are adequately resourced and that crews are trained and drilled in crisis management.

Know Your Limits

Narrative

A freight ro-ro ferry, with twin propellers and bow thrusters, was forced to abort an attempt to berth in strong winds, at a regular port of call when one of her bow thrusters failed as the unit's maximum operational rating was exceeded. The vessel proceeded to anchorage to await an improvement in weather conditions.

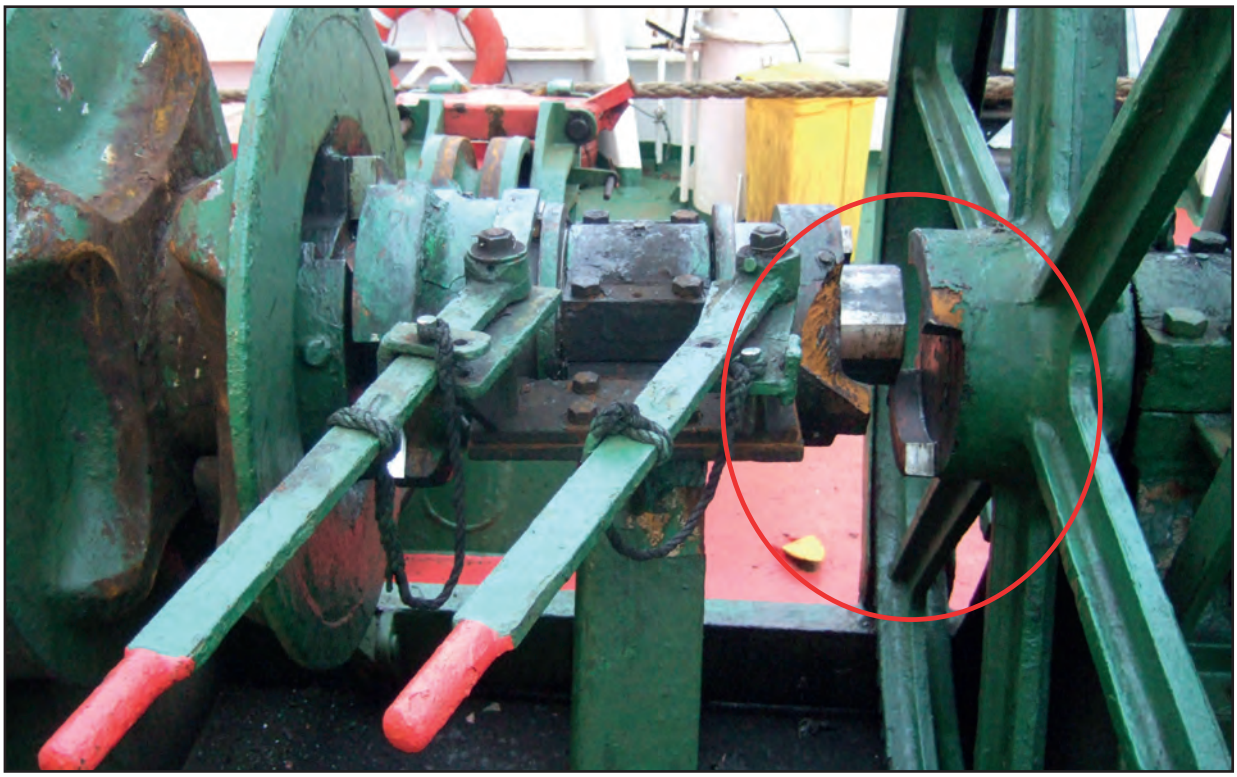
When at anchor, the weather deteriorated and the anchor chain began to render. The decision was taken to weigh anchor and proceed to sea. While the anchor was being weighed the cable rendered against the windlass, which caused catastrophic damage to the windlass drive shaft and clutch assembly. Once the situation had been assessed the anchor and chain were marked and slipped to enable the vessel to get underway.

The vessel returned to port on the following day, again in high winds, to make a further berthing attempt. On this occasion the vessel was unable to pass mooring lines ashore before she was set downwind into shallow water, and she grounded. A harbour tug was made fast aft to assist the vessel to refloat. However, while the tug was pulling at full power, the towline slipped from the towing hook and entered the water near the vessel's stern.

The vessel's crew began to heave the towline back on board. However, during this process the line fouled one of the vessel's propellers, which was still turning, and began to pay out rapidly and uncontrollably, striking and injuring a crewman.

The injured crewman was evacuated by the local lifeboat after which a further, successful, attempt was made to refloat the vessel. However, as the crew did not know if the towline had fouled only one or both of her propellers, the decision was taken to tow the vessel to sea, into gale force onshore winds, without using the vessel's engines.

The harbour tug managed to tow the vessel 2 miles off the port, where her remaining anchor was let go. However, within a few hours the anchor began to drag. The decision was taken to get underway using the propeller which was less likely to have been fouled by the towline. Fortunately this proved successful. The anchor was then weighed and the vessel returned to her original port of departure, where she berthed without further mishap.



Dog clutch damage and bent shaft

The Lessons

1. The crew were unaware that the bow thruster had a maximum limit of 30 minutes' operation. Had they been aware of this the berthing plan could have been revised to prevent the unit's failure at a critical stage of the berthing manoeuvre. Crews should ensure they know the limits of all operationally-critical equipment on their vessels.

2. The forces acting on the windlass while weighing anchor exceeded the strength of the equipment. Mariners should be aware of the limitations of their vessel's anchoring equipment, which is *"intended for temporary mooring of a vessel within a harbour or sheltered area when the vessel is awaiting berth or tide"*[1].

3. The decision to enter port to attempt to berth was, on both occasions, made without input from the harbour authority as no guidelines for port entry were in place. Harbour authorities should ensure, in accordance with the requirements of the Port Marine Safety Code, that a formal risk assessment is conducted to determine guidelines for harbour use in all weather conditions.

4. There have been many accidents involving injuries and fatalities to crew members who have been struck by ropes which have fouled propellers. Recovering a rope from the vicinity of a turning propeller is a hazardous task; crews should be made aware of the risks involved in such an operation.

5. The owners' Incident Management Team had closed up ashore to assist onboard decision-making when the vessel had grounded. Owners should ensure that they have emergency response arrangements in place which enable a proactive evaluation of recovery options to be provided to ships' staff in times of crisis.

[1] Extract from the International Association of Classification Societies *"Requirements concerning mooring, anchoring and towing"*, IACS Req 2007 http://www.iacs.org.uk/document/public/Publications/Unified_requirements/PDF/UR_A_pdf148.PDF

The Cost of Poor Planning

Narrative

While at anchor just outside port limits, the master of a support vessel decided to use the FRC as a platform from which to 'touch up' a small area of scratched paintwork on the vessel's port quarter. The weather and sea conditions appeared to be favourable; the wind speed was 10 knots and the swell was about 0.5m. As it was only a small paint job and would not take long, it could easily be combined with a planned boat drill. What could possibly go wrong?

The FRC's coxswain prepared the paint, rollers and a pilot ladder on the main deck and rigged lines to hold the FRC in position. Shortly afterwards, the chief officer briefed the coxswain and his crewman on the launch and recovery operations. Although the painting of the hull was mentioned in the brief, no details or hazards associated with this additional task were covered.

The FRC was lowered without incident. Following several minutes of manoeuvring, the coxswain drove the FRC under the supply vessel's cutaway on her port quarter (figure). The FRC was then secured using the pre-positioned lines fore and aft. However, the coxswain and his crewman had difficulty securing the lines on the FRC's bitts and, because the supply vessel had swung about her anchor due to a change in the tidal stream, the FRC was being buffeted against the port quarter by the swell. The coxswain had to push the FRC away from the vessel's hull several times and he complained to his crewman that they ought not to be there.

Although the vessel's master and chief officer were watching from the main deck, they could not see the FRC under the cutaway. The master sensed that the coxswain was having difficulties and asked him if it was safe to carry on. The coxswain replied that it was.

Moments later, the coxswain cried out in pain as he became trapped between the FRC's lifting frame and the supply vessel's hull. He soon fell to the deck. The chief officer quickly climbed down the ladder into the FRC and drove it under the port davit. The FRC was then hoisted back on deck. The coxswain was in pain but was conscious, and told his crew mates that he thought that he had cracked a rib. After looking at the International Medical Guide for Ships, the second officer gave the coxswain medication to ease the pain.

Meanwhile, the master notified the ship's agent of the accident, who in turn arranged for a nearby fishing vessel to take the coxswain ashore. The coxswain eventually reached a hospital about 2 hours after the accident, but he was declared dead shortly after his arrival.

Fast rescue craft under the vessel's cutaway on the port quarter

The Lessons

1. Unusual tasks present unusual hazards, and risk assessment is an invaluable tool to ensure that any activity is completed as safely as possible. A little job might look easy, but unless all of the factors are properly considered it is easy to be caught out by the unexpected.

2. Tides, tidal streams and the weather are constantly changing. Therefore, when undertaking a task that is affected by these elements, think ahead. Changes in weather and sea conditions, and the consequences of such changes, are usually predictable.

3. Human nature and professional pride often lead to seafarers taking risks to complete tasks in borderline conditions. Don't be tempted: if in doubt bale out - at least you will live to regret it!

4. A ship's medical officer is not a doctor, and the full extent of a person's injuries is not always apparent. As a general rule of thumb, where there is doubt it is always better to seek proper medical advice and immediate evacuation to hospital via the coastguard. In most cases, this will at least ensure that an injured person is diagnosed and treated as quickly as possible.

Ragtime Blues

Narrative

It was a clear, bright morning as the crew of a small passenger catamaran arrived on board to carry out their routine pre-sailing checks before their first trip of the day. While the master carried out his navigational aids checks, the mate went to the engine rooms and checked the fuel and main engines' fresh water header tank levels before dipping the main engine sumps. With all the checks completed, the ferry sailed at 0600.

The engine rooms had not been re-visited by the time the ferry neared her berth on the return leg of the crossing at 0700. Suddenly the port main engine high temperature alarm sounded. The master looked at the port engine room camera monitor situated in the wheelhouse (Figure 1) and saw black smoke rapidly developing at the forward end of the engine room, although the fire alarm had not sounded. He immediately stopped the port engine and notified his nearby shore office.

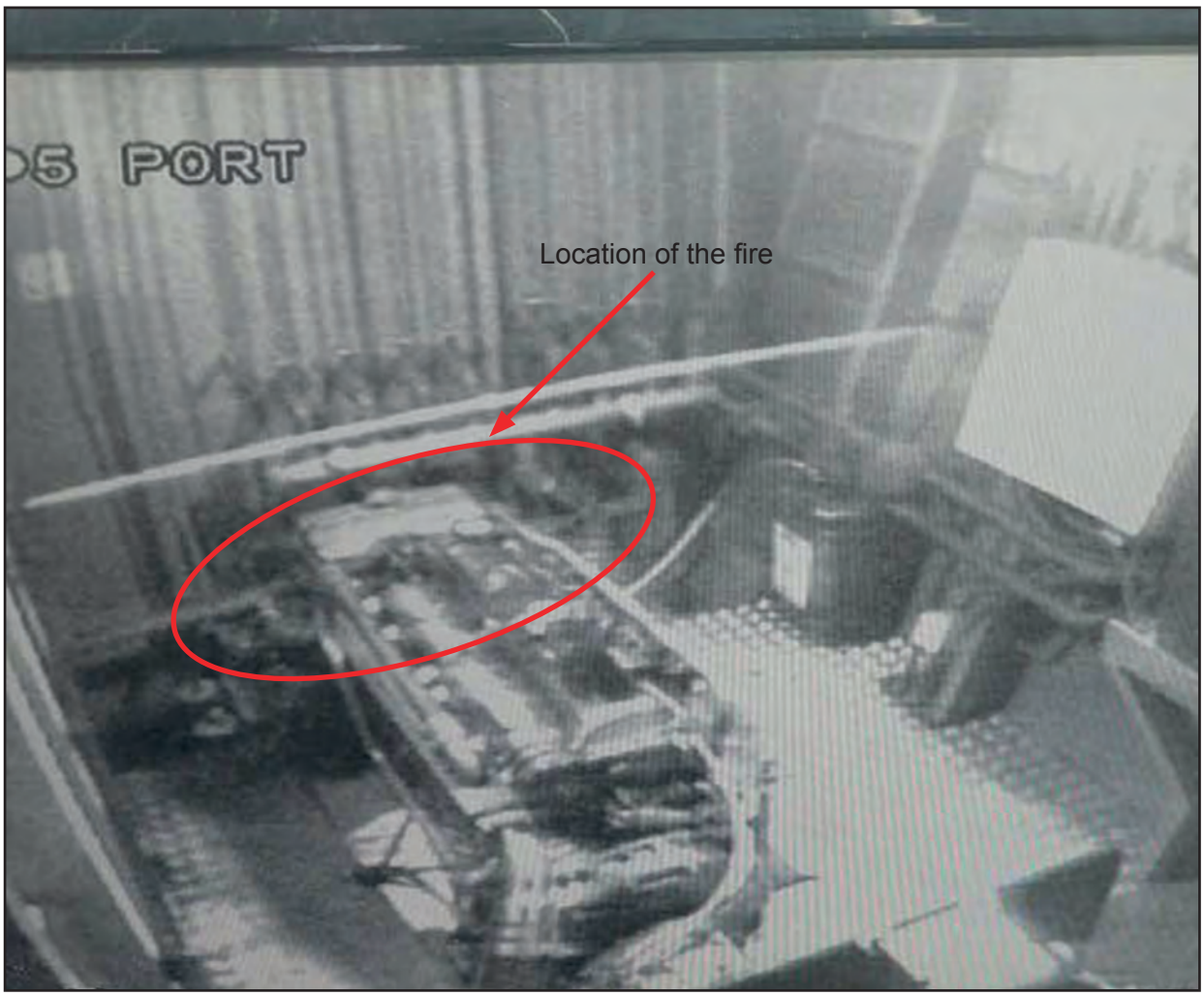


Figure 1: Port engine room camera monitor

In the meantime, the mate went into the port engine room and saw that the large oily rag he had used when dipping the engine sump was on the engine exhaust manifold and was on fire. Fortunately he was able to quickly put it out with one of the engine room portable fire extinguishers.

Although the starboard engine was unaffected, one of the company's other ferries was in the immediate vicinity and helped push the casualty vessel onto her berth, where the passengers were promptly disembarked.

Investigations found that when the mate did his pre-sailing checks, he wiped the engine sump dipstick on a rag, which he casually left on a tank top above the engine exhaust manifold. Vibration caused the oil-soaked rag to fall onto the hot manifold and catch fire. The small fire then ignited the engine high temperature alarm cabling loom, causing it to short circuit and set off the alarm in the wheelhouse (Figure 2). The functional fire and smoke alarm sensors were some distance from the fire, and the smoke and heat had not migrated that far by the time the master noticed the smoke on the camera monitor.

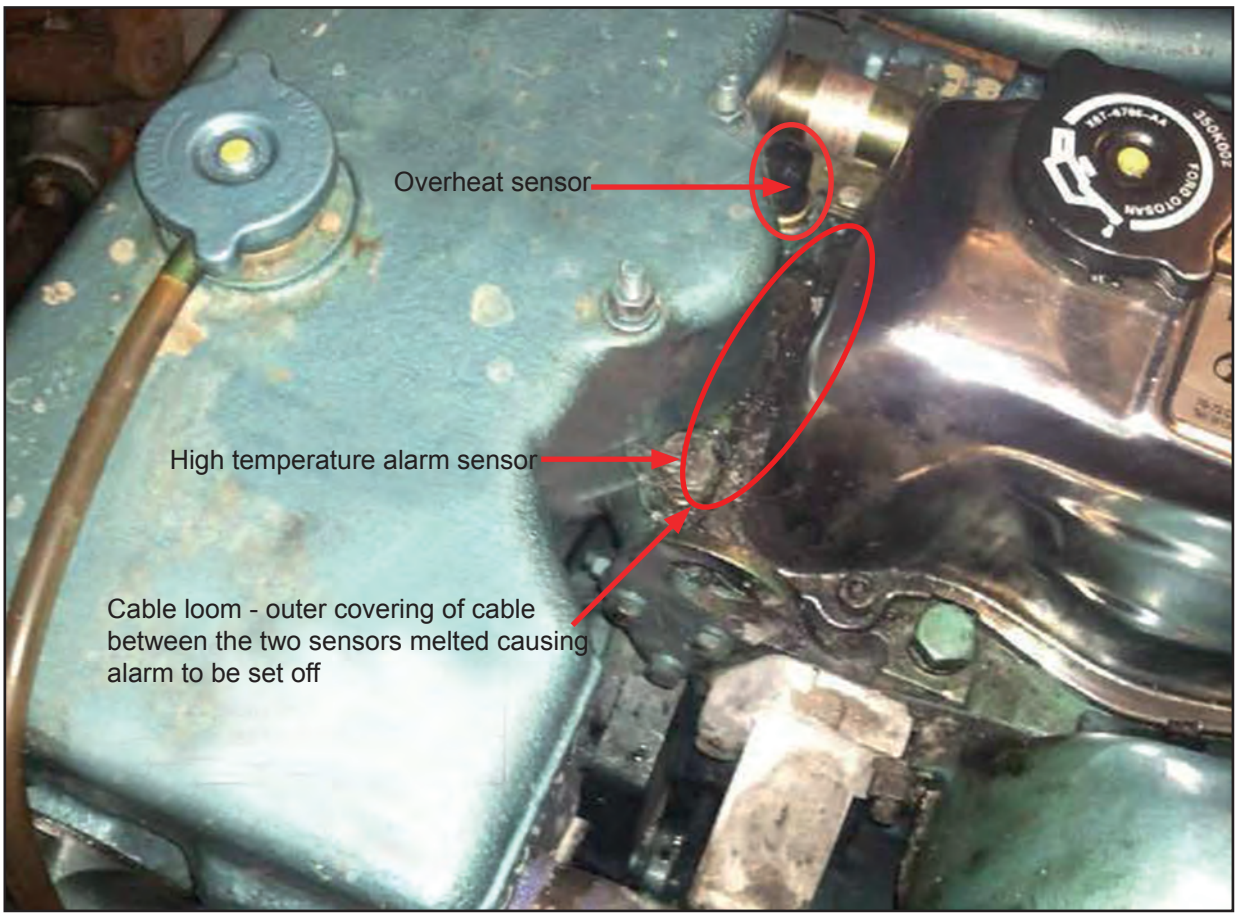


Figure 2: Location of fire and damage to the high temperature alarm cabling loom

The Lessons

On the face of it, this was a small incident that was dealt with quickly and safely. However, it does serve to highlight the importance of good housekeeping - in this case, the correct disposal of contaminated waste. Although the rag was ignited by the hot exhaust manifold, oil-soaked waste is also susceptible to self-heating and spontaneous combustion.

1. Distraction can cause carelessness in the proper disposal of waste. Discarded oily materials significantly increase fire risks, especially in hot areas such as engine rooms.

2. Do consider visiting the engine room(s) soon after starting equipment for the first time in the day. Equipment cools down overnight, and restarting it is a vulnerable time because leaks can occur when equipment reaches normal operating temperatures. Also, as this case shows, it provides the opportunity to identify other fire risks before they have the opportunity to develop.

3. Guidance on fire precautions and good housekeeping can be found in Chapter 8 of the Code of Safe Working Practices for Merchant Seamen. The publication is available on the MCA's website at www.dft.gov.uk/mca/coswp2010.pdf

Air-Cooled You Say?

Narrative

Some new owners took delivery of a second-hand narrow boat at a marina on a tidal river. The narrow boat was delivered by road and was craned into the sheltered waters of the marina. With all seeming to be well, the new owners and their friends boarded the boat with the intention of sailing to another marina for the night.

The boat was taken through the lock and into the marina. None of the five people on board had a lifejacket. One of them could not swim. Soon after entering the choppier waters of the river, the narrow boat took on a list.

The engine note changed and the new owners opened up the engine compartment to investigate the problem. Water was pouring into the engine bay and all the people on board gathered at the stern to help bail out the water.

The crew of a police boat passing nearby noticed the aspect of the boat in the water and altered course to investigate. As they approached the narrow boat, it sank beneath the water. Everyone was rescued and the boat was subsequently raised by the river authority.

An investigation of the boat showed that the hull had not been breached. The engine was air-cooled and the air passed through a substantial vent on the side of the hull. Over the years the boat had become heavier as steel was replaced and accessories were added. This meant that the vent got closer and closer to the waterline.

In the choppy waters of the river, it was possible for waves to lap over the lower edge of the vent. With three adults standing aft, the rate of flooding increased until the inevitable sinking happened.

Figure 1: The narrow boat during the sinking

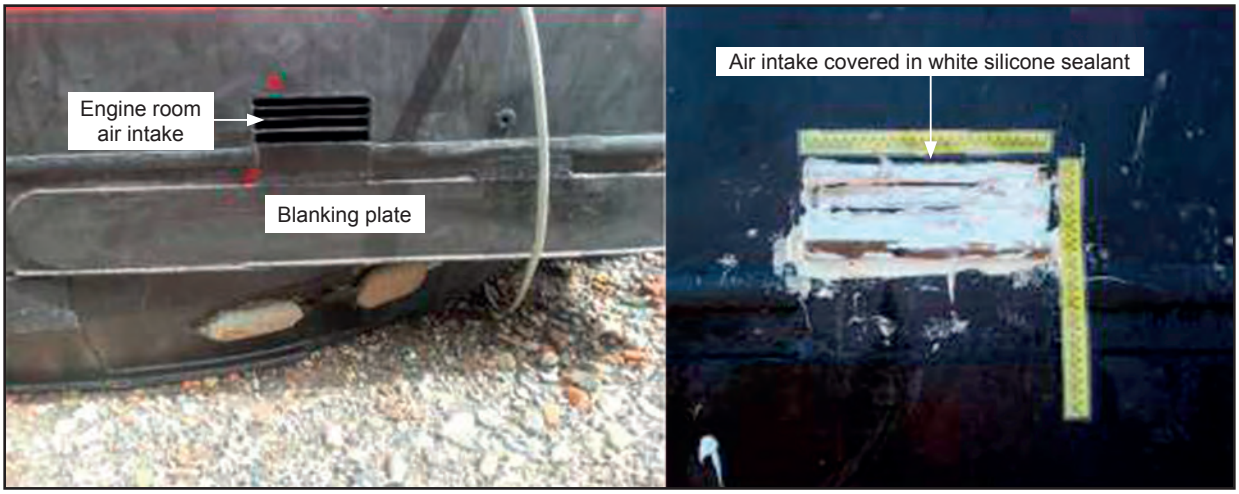


Figure 2: Engine room air intake

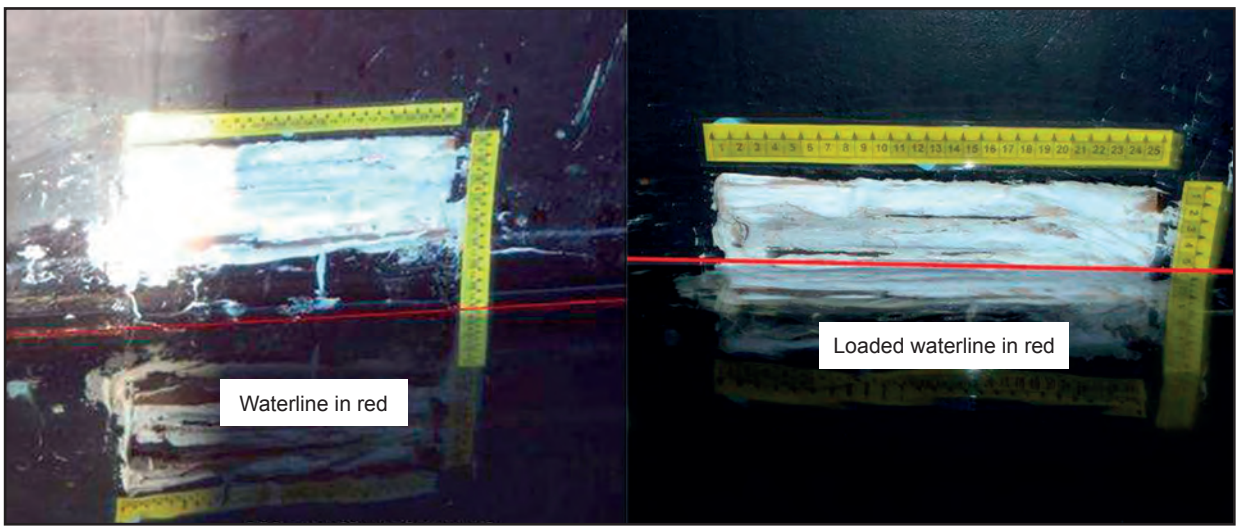


Figure 3: Position of the engine room air intake when the boat was refloated

The Lessons

1. Inland waterways vessels are generally designed for very benign conditions. Vessels should be checked very carefully, and expert advice sought where necessary before more challenging waters are ventured into.

2. Most boats gain weight over time from repairs and added equipment. Owners and operators must beware that hull openings that were once safely above the waterline can get dangerously close, particularly when there are guests on board.

3. Tidal rivers can be extremely dangerous. Always wear a lifejacket, particularly if you cannot swim. This accident could have had fatal consequences if help had not been so close by.

It's Good to Talk …

Narrative

A platform supply vessel lost control during a harbour manoeuvre, resulting in heavy contact with another vessel moored alongside.

After the vessel left her berth, her master, who was positioned at the aft-looking bridge console, handed control to the chief officer stationed at the forward-looking bridge console to take the vessel through the harbour. The chief officer was newly appointed and this was to be his first time in control of the ship. Although he had handled an azimuth thruster propelled ship before, it had been on a semi-automated system. The preferred system adopted by the bridge team on this vessel, however, was for full manual control of the thrusters. The chief officer did not inform the master that he had little experience in this mode of operation as he did not believe that it would be substantially different to what he was used to, and the master had not questioned the chief officer's experience because he knew he had extensive recent experience on board similar vessels.

The vessel was very shallow draughted, with the result that her bow tunnel thruster was not deeply submerged. Additionally, the tunnel thruster had no readily visible gauge to show how much power was being delivered to it. For the harbour manoeuvre, only two of the ship's generators were on line to supply power as it was not envisaged that much power would be needed.

The chief officer set each azimuth thruster to face 45° outwards for the ship move and proceeded to take the ship through a narrow channel between moored craft. As he progressed, he found that the bow thruster was having little effect when applied. As a consequence of this he controlled the ship's head by applying power to the appropriate aft azimuth thruster. Unfortunately, applying power to thrusters on their 45° orientation had the effect of increasing the vessel's forward speed as well as inducing a turning moment.

At a crucial point in the manoeuvre, the ship's speed increased to over 4 knots and she swung rapidly towards a moored vessel. The chief officer shouted to the master, who was still at the aft station, that the vessel was out of control. The master ran to the forward station and took evasive action by turning the azimuths to face astern and demanding full power. Unfortunately, before the non-running generators could come on line to give the demanded additional power, the ship collided with the moored vessel, damaging her bridge wing and windows (Figures 1 and 2). Fortunately there was no one on the bridge of the moored vessel at the time.

The master regained control and completed the ship move without further incident.

Figure 1: External damage to the bridge wing

Figure 2: Damage viewed from inside the bridge wing

The Lessons

1. The master and newly appointed chief officer did not communicate effectively with each other. The master assumed that because the chief officer had relevant experience, he could handle this ship; the chief officer on the other hand assumed that operating in the manual mode would not be significantly different to the semi-automatic mode he was used to. As Rule 7 of the Collision Regulations states, *"assumptions made on scanty information may be dangerous and should be avoided"*. A full exchange of previous experience and its relevance to the vessel's equipment and operating methods should form an essential part of all ship inductions for new joiners.

2. The master did not believe it was necessary for him to supervise the chief officer. It is not unreasonable to supervise new colleagues; such supervision not only allows the master to weigh up his team's abilities but also gives the new team member the reassurance that he has someone to turn to for advice until he is familiar with the new equipment and methods.

3. The bridge team assumed that minimal power would be sufficient since this was a simple harbour manoeuvre. However, the lack of available power resulted in the emergency avoiding action being ineffective. Full power should be available in any confined space manoeuvre, just in case things don't go as planned.

4. The port authority for this harbour had no procedures in place to ensure appropriate levels of ship-handling competence for vessels moving within the harbour; it assumed that ship managers would ensure appropriately trained personnel would be in control of their ships. Harbour authorities have the powers to demand ship-handling competence standards and, as part of their risk assessment and compliance with the Port Marine Safety Code, should mandate the level of ship-handling competence applicable to all vessels operating within their port confines.

Blown Out of Proportion

Narrative

A high speed catamaran (HSC) was scheduled to shift to an adjacent berth. Accordingly, a pilot had boarded the vessel and joined the vessel's master, chief officer and chief engineer on the bridge. He asked for a pilot card, but no card was provided and the vessel's manoeuvring characteristics were not explained to him. The pilot and master briefly discussed the manoeuvre and the master confirmed that, despite the strong north-westerly breeze, the high speed craft did not require tug assistance. No team briefing was held to discuss the conduct of the move or the roles and responsibilities of the bridge and mooring teams.

The master was at the aft-facing manoeuvring station in the centre of the bridge, from where his view of the area immediately around the vessel was limited. As the lines were let go, the wind increased and began to blow the vessel's bow to the south. In an attempt to keep the vessel parallel to the berth, the master adjusted its water jets, but was unable to prevent the vessel from being blown towards a finger jetty several meters off the vessel's port side. The HSC landed heavily on the end of the jetty (see Figure 1).

The master eventually managed to manoeuvre the HSC clear. However, in doing so, the vessel's starboard prow became wedged behind a fixed fender attached to a dolphin to the north. This was not seen by the master or the bridge team. The vessel continued to move ahead and the fender was detached from the dolphin (Figure 2). The vessel's starboard prow was also badly damaged. The HSC was assisted to her intended berth by the port's duty tug before proceeding to a repair yard. The catamaran was out of service for 5 days.

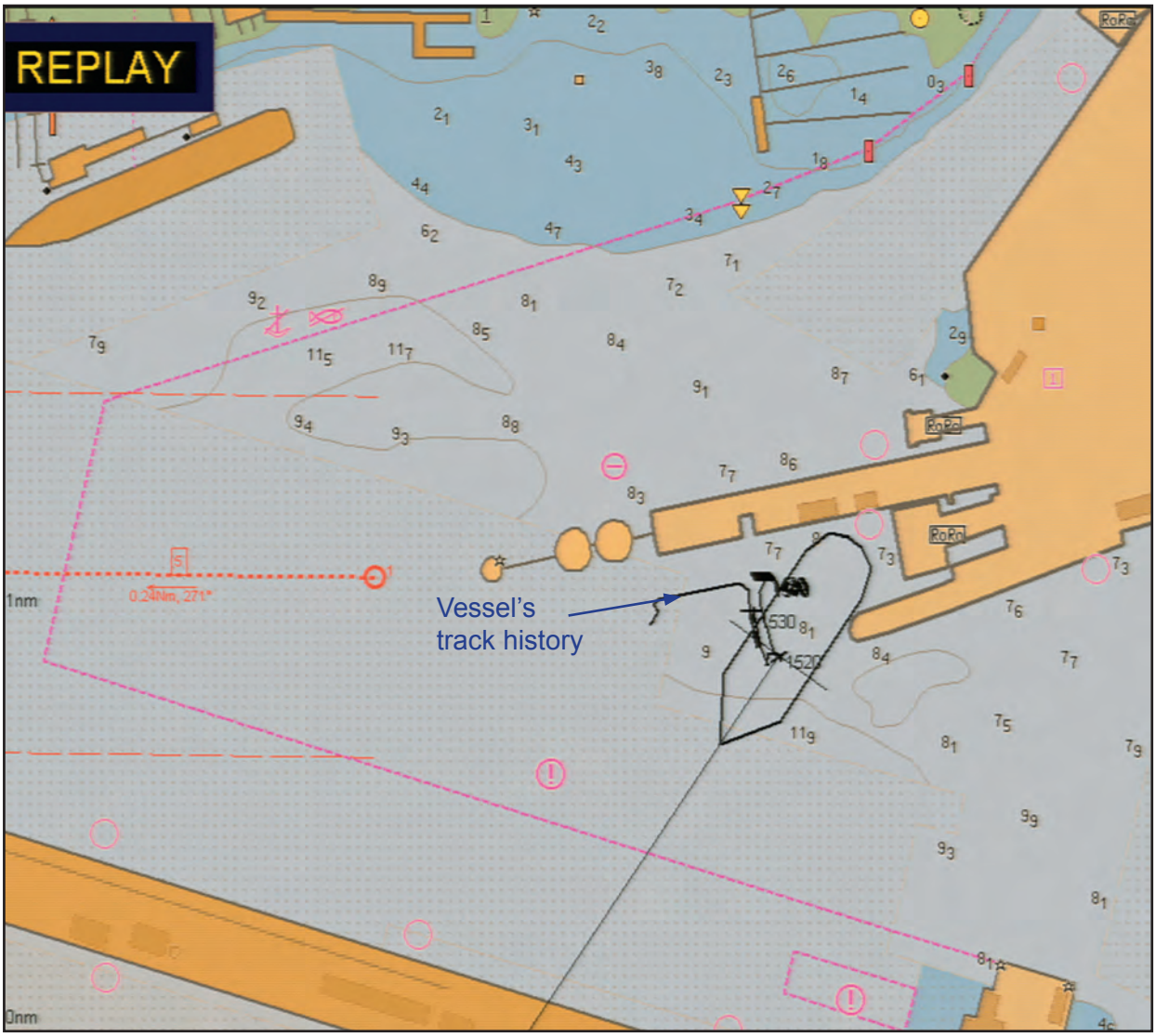


Figure 1: Vessel on finger jetty, heading 217°

Figure 2: Damaged fender

The Lessons

1. The manoeuvring characteristics and limitations of a vessel should always be taken into consideration irrespective of the distance being transited. If doubt exists concerning a vessel's ability to manoeuvre in the conditions experienced, it is usually safer to order a tug and not use it, rather than not to have a tug available at all.

2. As no safety briefing was held before the manoeuvre, the bridge team were unable to support the master. Team briefings keep everyone in the picture so that each person is then better placed to see when things are starting to go wrong and to take positive action to assist.

3. Regular reporting from lookouts stationed fore and aft is very important when mooring in tight areas. However, they must be briefed on what to report, when to report, and how to report.

4. Effective communications and information exchange between masters and pilots are pivotal to their mutual understanding of a vessel's intended operation or movement. Without them, a pilot is seldom much use to a master, and vice versa.

Part 2 - Fishing Vessels

I understand that recent statistics show a welcome decline in the number of accidents, which is a clear signal of an improving safety culture in the fishing industry. However, nobody should be complacent; there are still too many incidents and there is always room for improvement.

Hindsight is a wonderful thing and in the case of most accidents too late. However the MAIB Safety Digest contains information which if "taken on board" can help prevent some of the terrible incidents happening again.

Everyone has a part to play in their own safety, and where safety equipment is available it is vital to know how to use it or wear it correctly. It is important that crews appreciate the importance of attending all of the mandatory basic safety courses. There needs to be an understanding that these courses are not just a bureaucratic exercise or an unnecessary waste of time, the knowledge and information passed on during them may save a life or prevent an accident.

I am very pleased with safety initiatives from the Cornish Fish Producers Organisation, the National Federation of Fishermen's Organisations and Seafood Cornwall Training and their collective efforts to promote safety throughout the fishing industry. In particular I welcome the NFFO's most recent safety initiative to supply PFDs to its members.

As a member of a family fishing company owning beam-trawlers operating out of Newlyn I have always tried to take safety seriously and encourage crews to complete as much training as possible. But I am aware that it can be difficult to spare the hours during time off or to give up valuable fishing time.

Being married to a ring net skipper and with teenage boys fishing I am even more aware of the dangers of the sea and recently encouraged my son to attend the Seafood Cornwall Training's 'Under-16s Introduction to Safety at Sea' training course.

No fisherman goes to sea with the intention of harming himself or others, or not coming back. But perhaps with a little more time spent on training or assessing risks where possible it may prevent or lessen the severity of an accident.

Remember it is the loved ones back on shore that are left behind to pick up the pieces.

E. C. Stevenson

Elizabeth has always lived in the fishing port of Newlyn.

After leaving school she joined the family firm of W. Stevenson & Sons owning and operating beamers from the port of Newlyn and where she has worked for 40 years.

Elizabeth is married to Sam Lambourn, owner and skipper of Lyonesse PZ 81, a ring netter. Just recently Sam and Elizabeth went into business together purchasing the gill netter Britannia V FH 121.

Elizabeth has held many positions in the industry, including past chairman and president of the NFFO and currently secretary of the CFPO.

Too Good A Catch

Narrative

An 11m wooden fishing vessel had been successfully used for wreck and drift netting for many years. However, the skipper converted the vessel to ring-netting in order to cash in on big catches of pilchards. He also removed the pound boards from inside the fish hold and fitted a watertight flexible 'tank' (figure) in the hold to make it easier to store and remove the fish.

During a routine fishing trip, the skipper detected a very large shoal of fish on the sonar. The vessel was in a sheltered bay and the conditions were good, so the skipper and his deckhand laid out the ring net. A bumper catch of pilchards was then hauled alongside and the skipper and the deckhand brailed the fish into large tubs on deck, and then filled the tank in the fish hold.

As there were still lots of fish in the net, the skipper called up the skipper of a smaller vessel fishing nearby and offered him the remaining catch. When the smaller vessel arrived, the fish were quickly removed from the net, and the net was hauled.

The converted vessel then set sail for home. She had a bumper catch on board and was very low in the water. The skipper was in the wheelhouse while the deckhand sorted the fishing gear on the open deck. The smaller vessel was following about 1.5 miles behind. By now, the sea conditions had deteriorated and it was dark. The skipper found that the autopilot had difficulty in keeping the vessel on a steady heading. As the vessel yawed, water came through the freeing ports on to the deck. Although the shutters on the freeing ports were closed, they were not watertight.

Eventually, the skipper changed to hand-steering and found that he had to use a lot of helm to steer his vessel, and as water was still coming on to the deck, he opened one of the freeing port shutters to try and drain it away. The vessel was now rolling very slowly and the skipper began to think that something wasn't quite right. The vessel then rolled to starboard, but this time she kept rolling until she capsized.

The skipper escaped from the wheelhouse and surfaced after fighting his way through loose ropes. Moments later, he heard the deckhand struggling to stay afloat nearby. The men were not wearing lifejackets and the vessel's liferaft was nowhere to be seen. The deckhand was not a strong swimmer and had to be assisted by the skipper.

Fortunately, the skipper of the smaller fishing vessel saw the deck lights and the radar target of the capsized vessel disappear. He steered for the position where the capsized vessel was last seen and quickly saw the two men in the water. Unfortunately, by the time the two men were hauled on board, the deckhand had drowned. The liferaft was never found.

The Lessons

1. Modifications which affect a vessel's stability need careful consideration. Any changes in weight will inevitably impact on a vessel's righting lever and her freeboard, both of which are crucial to safety. If in doubt, seek advice from a qualified surveyor to determine the best way forward. The consequences in failing to do so can be sudden, and fatal.

2. The problem of catching more fish than you can safely carry is a nice problem to have. However, be sensible and keep an eye on your freeboard. Don't wait for a long slow roll to develop and for water to get onto the deck to raise your concerns - by then it could be too late.

3. The free surface effect of fluids on board any vessel is potentially dangerous. This includes fish and entrained water. Therefore, think twice before removing pound boards - they are not just furniture; they are there for a reason.

4. Although not mandatory, stability awareness training is freely available to fishermen. Training removes the myths concerning stability and simplifies a complicated subject. Do you know your GM from your GZ? You might want to.

5. Once again a fisherman drowned because he was not wearing a lifejacket. Enough said.

6. If a liferaft is worth carrying, it is well worth making sure that it is properly connected so that it will release quickly when needed. When did you last check to see if your liferaft was secured properly?

7. It was fortunate that in this case, the skipper of the following vessel quickly realised that something had gone badly wrong. If he hadn't, this already tragic accident might well have taken the life of the skipper as well as the deckhand. Although EPIRBs are not mandatory on all fishing vessels, their ability to quickly alert the coastguard in the event of the unthinkable happening is well proven. Swimming offshore at night because your boat has sunk is not the time to wish that you had bought one.

Where's That Light?

Narrative

A fishing vessel skipper decided to berth his vessel alongside overnight after 2 days of fishing. The harbour concerned was not his home port but he had visited it previously and had a healthy respect for the difficulties involved when entering the port at night.

The skipper set a course for the harbour and went below to rest, leaving a crewman on watch. The crewman roused the skipper a mile or so from the harbour entrance. The skipper then returned to the wheelhouse. He instructed the three crew to prepare the boat for coming alongside, switching on a floodlight to illuminate the deck. There was a light breeze and the sea was calm.

In the wheelhouse the skipper had a chart plotter, video plotter and radar in operation. He started to follow a historical track on the video plotter and, at the same time, scanned the sea ahead looking for a green navigation light that marked a reef to one side of the harbour entrance. The skipper then reduced the throttle to tick over, corresponding to roughly 5 knots. His intention was to pass between the end of the breakwater and the green light. Although the skipper could clearly see the breakwater lights, he was unable to make out the green light as the vessel approached the harbour entrance.

Suddenly there was a shout from a crewman on deck when he saw rocks underwater ahead. The boat juddered as she ran aground on the reef, and the engine then stopped. As the vessel started to list to starboard, the skipper broadcast a "Mayday" on VHF radio Channel 16 and instructed the crew to don lifejackets and deploy the liferaft.

He then telephoned the skipper of another fishing vessel that was returning to the harbour. Once that boat was in sight, all four crew climbed into the liferaft and paddled themselves into deep water, where they were rescued.

The fishing vessel refloated on the next tide. The skipper returned to the vessel and brought her into the harbour, under her own power. She had suffered only minor damage and returned to her home port for repair the same day.

Unbeknown to the skipper, the green navigation light was inoperative at the time of the accident. However, the harbour's sectored leading light was functioning normally.

Unlit beacon

The Lessons

1. Navigating by following previously saved tracks on a chart or video plotter is not recommended given these systems are often primarily designed for fishing, not navigation. Previous tracks can be inaccurate and the electronic charts misleading. In this particular case, some historical tracks even passed through the breakwater.

2. In this case, a suitable passage should have consisted of setting a course that ensured the vessel was in the safe sector of the leading light at least 1 mile from the harbour entrance. Once assured of his position, the skipper had only to steer a course to keep the vessel within the safe sector to ensure her safe passage into the harbour. MGN 313(F) provides guidance on best navigational practices.

3. Although you may think you are familiar with a harbour, consult the chart and fisherman's pilot as part of your passage planning, to ensure you are fully aware of a harbour's aids to navigation. In this particular case, the sectored light provided an ideal means of entering the harbour at night, and was clearly visible. Aids to navigation are provided for your safety; make the most of them.

4. Operators of fishing boats of less than 16.5m in length are not required to hold a Certificate of Competency. However, this does not remove the need for a skipper to be competent to navigate a vessel safely. Undertaking the voluntary training currently on offer, that leads to the award of a Certificate of Competency, is a very useful way for fishermen to refresh and update their navigational skills. MGN 411 (M+F) provides further details.

5. The skipper's instruction to abandon the vessel was a prudent decision, ensuring all the crew were safe. However, he would have been more assured of an immediate response from the coastguard had he initially raised the alarm by pressing the VHF DSC distress button. The coastguard no longer maintains a dedicated watch on VHF radio Channel 16.

Lifejackets do Work

Narrative

Crab pots were being shot manually from a vivier potter. The vessel rolled heavily and a crewman was pulled overboard as he held onto a pot, which came under increased tension. Fortunately he was not entangled in the gear and was wearing an inflatable lifejacket, which inflated and quickly brought him to the surface.

The skipper immediately put in place procedures that had been regularly drilled; he instructed the crew to cut the back rope and tasked a crew member to keep an eye on the casualty while he brought the vessel about. A life-ring was also retrieved from the wheelhouse roof and thrown to the casualty - who was being kept afloat by his lifejacket.

The skipper manoeuvred his boat alongside the casualty and with the aid of the pot hauler and a rope with a bowline recovered the conscious casualty from the sea.

The man was safe and well despite having spent several minutes in chilly water. As a precaution, the skipper notified the coastguard who, in turn, tasked a helicopter to airlift the casualty to hospital as a further precaution against secondary drowning or hypothermia. The casualty was discharged from hospital later that day having suffered no ill effects.

The Lessons

1. **Without doubt the crew's calm, well drilled reactions to the emergency and the wearing of an inflatable lifejacket saved the casualty's life. Conducting effective drills and the routine wearing of PFDs when working on deck both reflect best practice. Combining the two can save lives.**

2. **The skipper identified a safety lesson from this accident regarding the stowage of life-rings on the wheelhouse roof. Had the vessel carried fewer crew members, the life-rings' out of the way stowage could have caused unnecessary delays in similar emergencies. He has therefore now positioned one life-ring on the deck so that it is within easy reach.**

3. **When a boat rolls heavily there is often a need, and a natural tendency, to hold onto something in order to remain steady. Just make sure that this is part of the boat, and not something that is being pulled overboard under tension!**

4. **The skipper's decision to notify the coastguard of the safely recovered man overboard was a precautionary measure. And he was correct to do so. Had the casualty suffered belated ill effects, any delay in notifying the coastguard could have made his recovery more difficult, or impossible.**

5. **In this instance, the MOB was conscious and able to help himself back on board. Had he been unconscious, the task would have been substantially more difficult. Give some thought as to how you would recover an unconscious person back on board your boat and make preparations just in case.**

Keep Your Feet on the Deck

Narrative

The skipper of a stern trawler had manoeuvred his vessel around before the strong wind and seas and was in the process of hauling his nets on to the net drums, which were positioned high up on the back of the vessel's superstructure. As the bridles wound onto the drums, a deck-hand climbed on to the transom top rail to manually spread the bridles apart to help them stow neatly ready for the next shooting operation. Although this was accepted practice in good weather conditions, the skipper did not expect the crew to attempt such a thing on a day like this.

As the deckhand pushed the bridles apart (Figure 1), his colleagues saw a large wave rising astern, and they shouted to him to climb down onto the deck. However, the deckhand remained where he was. The wave hit the stern, swamped the quarterdeck and carried the man from the top rail and into the sea.

The skipper immediately stopped the trawler in the water, and a lifebuoy was quickly thrown to the casualty, who was seen floundering several metres astern of the boat. Unfortunately, the casualty was unable to grab the lifebuoy or the nearby net floats and very soon the boat was driven away from him by the following wind and seas.

The skipper skilfully manoeuvred the trawler (with the nets streaming behind) around to the casualty, where his colleagues reached out to him with a prawn rake (Figure 2) (they had no boat hook on board) and shouted to him to grasp it. He showed no signs of understanding their commands, so they manoeuvred the blade of the rake under his arm to help support him. As they did this, his arm lifted into the air and he slipped below the surface.

Despite a prolonged search by the local fishing fleet and SAR assets, the casualty was not found until his body was trawled up in a net several weeks later.

Figure 1: Position of casualty at time of being swept overboard

Figure 2: Prawn rake used for attempted retrieval; no substitute for a boat hook

The Lessons

1. Fishing is an inherently hazardous profession even without the introduction of additional dangers. The act of standing on the top rail to spread bridles apart, during any weather conditions, was extremely reckless. Although this process was devised by the crew in order to speed up the shooting process, it was condoned by the skipper. Just as skippers and owners have a duty of care to provide a safe workplace, crew members have a duty of care to ensure that they, themselves, work safely. This did not take place.

2. Regardless of the daily dangers imposed by fishing, everyone on board must constantly consider the effect of their actions. The casualty in this case showed an extreme disregard for his own self-preservation, and he paid the ultimate price. Additionally, his colleagues now also have to live with the feelings of guilt and the trauma of a needless accident.

3. The casualty was either unconscious or was unable to help himself when his colleagues reached down to him. Lifting his arm with the prawn rake allowed air trapped within his clothing to escape, resulting in his slipping below the surface. On being swept overboard, the casualty would almost certainly have been affected by cold water shock. This would have caused: involuntary gasping and ingestion of sea water; hyper-ventilation (if his windpipe was not closed due to muscle spasm); a racing heart rate, and a dramatic increase in blood pressure. In such circumstances, wearing a lifejacket would have significantly increased the deckhand's chances of survival, and would have made it easier for his colleagues to rescue him.

4. On board vessels of over 15m in length, skippers and owners have an obligation to ensure their crews are regularly trained in emergency procedures such as MOB drills. These had not taken place on board this vessel.

   Had regular MOB drills been carried out, consideration might have been given to the method by which a man overboard would best be recovered. Appropriately conducted drills might also have highlighted the dangers associated with standing on the top rail, the need for carrying a simple boathook on board, and the benefits of PFDs.

   The time taken to carry out such drills does not, unfortunately, earn hard-working share fishermen money. Indeed, *it gives them something far more valuable:* a better chance of returning home alive.

Too Hot to Handle

Narrative

A stern trawler was 60 miles offshore returning to her home port after a successful fishing trip. Her skipper was on watch in the wheelhouse while the vessel's four crewmen slept in their cabins two decks below. All was quiet until the skipper smelt smoke. He peered down the access hatch and saw smoke in the main alleyway below, but he could not see where it was coming from.

The skipper began shouting through the hatch for the crew to get up. He also used the crew intercom system to call them, but he did not say what the problem was. Fortunately, the crew heard the calls on the intercom and made their way on to the open deck where they met the skipper, who had left the wheelhouse after reducing the vessel's speed.

By now, the wheelhouse, the shelter deck, and much of the accommodation were filled with thick black smoke which was spreading and becoming more dense by the minute. The skipper told the crew to launch one of the vessel's two liferafts carried on the main deck. He then removed the EPIRB from the wheelhouse top and manually activated it. When the crew threw the liferaft overboard, it inflated, but its painter soon parted due to the trawler's speed.

Things were not going well. None of the men were wearing lifejackets, and the four crewmen were scantily dressed. As the situation worsened, the skipper broke a wheelhouse window with a hammer and then tried to move the throttle lever to stop the vessel in the water. Unfortunately, the skipper was hindered by the heat and smoke venting from the broken window and he inadvertently pushed the throttle in the wrong direction. As a consequence both the vessel's speed and the fire's intensity increased.

With few options remaining, the skipper and crew stood cold and wet from the sea spray on the open foredeck as their vessel burned. However, the main engine then suddenly stopped. The vessel's speed reduced sufficiently to allow the remaining liferaft to be launched and for the skipper and the crewmen to abandon the vessel just as the mast on top of the wheelhouse collapsed.

Although the EPIRB battery was out of date, the EPIRB had worked and its signal had been received by the coastguard, and a surveillance aircraft was tasked to locate the vessel. The burning trawler (see figure) and the liferafts were located 1 hour after the EPIRB's activation. The vessel's skipper and crew were later winched on board a rescue helicopter but the trawler foundered shortly afterwards.

The cause of the fire is unknown, but it is likely to have started in the engine room. A fire detection system was fitted but it was not routinely tested and clearly it did not work on this occasion. The fire appears to have spread rapidly for a number of reasons, including: a number of doors and hatches were either not properly sealed or were left open; the engine was not stopped by use of the 'emergency stop' in the wheelhouse or the fuel supply trips at the foot of the wheelhouse access; the crew were unable to get to the activation point for the fixed CO_2 extinguishing system for the engine room, which was sited on the shelter deck; and the crew were not drilled to deal with a fire on board.

The stern trawler on fire

The Lessons

1. Fire detection systems, like bilge alarms, are the first lines of defence. If they don't work, fires and floods can be out of control before anyone is even aware that they have started. Testing of these systems is usually quick and simple, and the time taken is a very small investment compared to the cost of someone's life or the loss of a vessel.

2. Most fires on board fishing vessels are small and are usually put out quickly and without difficulty by one or two people. The problems arise when the nature of a fire needs everyone on board to respond effectively. This will only be possible if, in addition to completing basic fire-fighting training, a vessel's crew is also familiar with the vessel's layout, fire-fighting and safety equipment, and with the key actions to be taken in differing situations. Standing on the foredeck of a burning vessel in the open sea, and unable to launch a liferaft, is not the time to think 'if only we had'. Drills are not just a regulatory requirement; they are also potential life-savers.

3. When finding or suspecting a fire, the raising of the alarm is critical. Don't be vague, shout or broadcast '*fire, fire, fire*' followed by its location if known. Otherwise, not only might help be slow to arrive, but some crew might unknowingly rush right into the danger.

4. Fires spread rapidly when they have an open and unimpeded path. If a door or hatch doesn't need to remain open, then close it, and fit automatic closing devices rather than hook or holdbacks. Don't give a fire a fighting chance - fight back.

5. Letting someone know that you are in trouble at sea is something we must all be prepared to do when the need arises. Don't delay taking this action, otherwise the availability of key equipment such as DSC, which only takes the press of a button, might soon be lost. Also, make sure that you carry an EPIRB and that the battery in the EPIRB is in date - not everyone will be as fortunate as the crew on board this vessel in this respect.

Ready? Aye, Ready

Narrative

A trawler was leaving harbour during the small dark hours when suddenly the engine stopped without warning or change in engine note. The skipper immediately realised that his propeller was probably fouled and that he had little time before the boat would be driven onto the nearby harbour entrance rocks. He always kept his anchor ready for such eventualities and was able to let it go without delay, which brought the stricken craft up just clear of the rocks. The skipper contacted the coastguard, who immediately tasked a lifeboat to assist. The lifeboat duly arrived and soon had the disabled craft under tow.

Once back in the safety of the harbour, the skipper was able to beach his boat and make an inspection at low tide. Drying out revealed that the propeller was indeed fouled by a section of double, 8mm thick netting that had either been discarded carelessly or, more probably, torn from a trawl belly and carried by the tide towards the shore.

Net fouling propeller

The Lessons

1. This forward thinking skipper had his anchor ready for immediate use. In situations such as this, self-help is often the only help available.

   The anchor is a vital part of safety equipment and should be maintained as such. It would have been of little value to this skipper if he'd had to break it out from under piles of gear or seek and attach an unprepared chain.

2. The skipper recognised the signs of propeller fouling: the engine stopping suddenly, without gradual power loss, or the engine miss-firing. Dropping the anchor first was the most sensible and effective time-buying solution available to him. It arrested the boat's drift and bought time for investigating the cause.

Liferafts Save Lives

Narrative

A small beam trawler headed towards her regular fishing grounds with three crew on board. That night, conditions were ideal, with a calm sea and a light breeze. The first haul found the nets clogged with small shells, but the next two hauls went without incident. The nets were shot away and one of the crew rested while the other sorted the catch. Shortly afterwards, the skipper realised he had something heavy in the nets and decided to haul the gear to sort the problem out.

He was unable to haul both nets together on the main winch and so hauled each net in turn until both were near the surface. He then drove ahead for a few minutes to try and clear the debris from the nets. He repeated this process twice more, the last time with the beam derricks at 45°, with no success. The skipper then took the vessel out of gear and allowed the beams to rotate, with the intention of shooting the gear upside down so that he could break out the blockages in the nets.

Suddenly, the load in the starboard net released, capsizing the vessel to port. The skipper tried to pay out the port trawl wire but the main engine stopped, resulting in the loss of hydraulic power and a consequent inability to disengage the winch dog clutch. All three crew managed to get to the wheelhouse roof, and they manually released the liferaft. As it inflated, it had to be pushed clear of the vessel's mast before all three crew managed to climb on board.

The crew tried to find the knife on the liferaft in order to cut the painter, but in the dark they were unable to locate it. One of them climbed out of the raft, made his way down the starboard side of the fishing vessel and retrieved a knife from the aft gantry. He returned to the liferaft and cut the painter. Shortly afterwards the fishing vessel sank.

The crew located the emergency pack in the liferaft and retrieved the torch and hand flares. They tried to attract the attention of a ship 3-4 miles away, but with no success. The three huddled together for warmth during the night, and it was not until midday that the three were eventually rescued by a passing vessel and then flown ashore by helicopter.

The Lessons

1. Beam trawling is recognised as a particularly hazardous fishing activity. Unusually for her size the vessel satisfied the stability requirements for a beam trawler at build. Unfortunately, no lightship checks had been conducted since then to establish if the vessel still had sufficient reserves of stability. If your vessel is fortunate enough to have stability information, a lightship check is recommended every 5 years to ensure the information remains valid.

2. Heavy loads or snagged gear are common hazards for beam trawlers. There must be an effective means of releasing trawl wires in an emergency to prevent uneven loading. Trawl winch dog clutches are problematic as they cannot be released when under load, so it is vital to minimise the time with the clutches engaged. Additionally, ensure your derrick head block emergency release is operational and that the crew know how to activate it. It may provide you with sufficient time to recover the situation.

3. The liferaft undoubtedly saved the lives of the three crew involved in this incident. Fortunately, it had been recently serviced and the crew members' sea survival training ensured they knew how to deploy it. However, the level of survival equipment within the raft came as a surprise to them as they were expecting more. The equipment that is provided with a liferaft varies depending on whether rescue is expected within 24 hours. Consider whether you require a pack with more survival equipment, or have a separate grab-bag you can take when abandoning ship.

4. A quicker rescue would have been possible had the crew managed to retrieve the EPIRB from the wheelhouse. EPIRBs must be registered and, ideally, fitted in a float-free housing with a hydrostatic release to maximise the chance of them operating, or at least being readily accessible following a capsize.

Part 3 - Small Craft

How MAIB made me a better sailor

One of the things I love about Britain is the absolute freedom we have to mess about in seagoing boats. No exam, licence or certificate required. Many people find that shocking, and in most other countries you'd be breaking the law.

Not here, though. We're free to navigate at our own risk, using our own wits and common sense. And yet the UK's maritime safety record is among the best in Europe. Our voluntary training is pretty good, too. The British RYA syllabus is taught in 43 other countries. But beyond courses and exams, knowledge and technique, what really counts is seamanship.

You can't teach that, but you'll hear it thoughtfully debated in waterside taverns and yacht club bars, a serious topic at even the rowdiest gathering of seafaring folk. It's part of the British boating mindset, a compulsion to confess and compare our choicest nautical blunders. We question but don't condemn; we empathise, analyse and learn from each other's mistakes. And this mindset, I believe, improves our seamanship.

This, too, is where the *MAIB Safety Digest* makes its valuable contribution to our safety at sea. It does not berate individuals, nor apportion blame, but pinpoints root causes of accidents and explains how they might have been avoided. I don't always agree unreservedly with every one of its conclusions - nor, as an amateur navigator, would I expect to - but MAIB's insightful analysis has provided much food for thought, prompted me to make my own boats more seaworthy and improved my decision-making. Three MAIB reports, in particular, stand out in my mind.

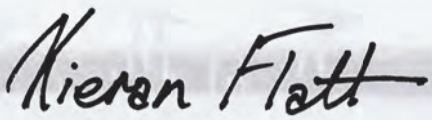
The report, in 2000, on the disappearance in the North Sea of the 28ft yacht *Tuila* - a sister ship to my own *Cleaver II* - was a stark warning of the vulnerability of small craft in the crowded 'narrow seas' around our coasts, no matter how experienced the skipper.

MAIB's 2006 analysis of the loss of the 26ft *Ouzo*, mown down by a ship off the south coast of the Isle of Wight, was a wake-up call to all small craft skippers that ships cannot be relied upon to see us, that the passive radar reflectors fitted to nearly all yachts and motorboats at the time were next to useless, and that crotch straps and sprayhoods are essential parts of a lifejacket, not optional extras.

The following year's report into the 'radar-assisted' collision between the yacht *Whispa* and the tanker *Gas Monarch* highlighted the danger of using even the best electronic navigational tools when you don't fully understand the finer points of calibrating them and interpreting the data on the screen.

As a RIB driver, this issue of the Safety Digest made for a chastening read. I bought an Avon Searider last autumn and have been meaning to fit a killcord for months. Now I have. The consequences of using the boat without one could be lethal to other people.

With the freedom to mess around in boats comes the responsibility of managing our own risks, for the safety of others as well as ourselves. The MAIB Safety Digest serves up crucial lessons for all seafarers and shows us how to analyse our own seamanship. I urge you to read it.



Kieran Flatt
Editor, Yachting Monthly

Kieran Flatt learned to sail as a child in the Cayman Islands, on an elderly windsurfer that was tethered to a coconut tree with five fathoms of rope to avoid being blown out to sea. In a rude awakening at age 12, he learned the usefulness of boats you can sit in, rather than stand on, when he fell into the freezing-cold waters of the English Channel.

He then spent a carefree adolescence capsizing, broaching and pitch-poling various dinghies around Bembridge Harbour, on the Isle of Wight; failed a degree course in naval architecture, but gained an RYA instructor's ticket and taught sailing in the Solent and north Brittany.

When a fondness for sausages began to impair his ability to keep small craft on an even keel, he talked his way aboard a succession of keelboats and offshore racing yachts. But after gaining a reputation for ensuring any skipper a place at the back of the fleet, he realised that it would be in everyone's best interest for him to focus on cruising instead.

He now sails a slightly grubby, long-keeled 28ft Twister sloop and has made his wife, Rachel, wretchedly seasick in every Shipping Forecast area between Dover, Biscay and Irish Sea. He joined Yachting Monthly as production editor in 2007, after editing a business journal and moonlighting as a restaurant critic for the best part of a decade.

Double Trouble

Narrative

After a couple of drinks, two owners of a RIB went for a trip on a river. They stopped for a double rum at a riverside bar before starting their return passage in the dark. On the way back, the driver increased the engine throttle so that the RIB was travelling on the plane.

Meanwhile, a passenger vessel was heading in the opposite direction at a speed of 8 knots. Her master saw the RIB through the bridge arch ahead heading straight for his vessel at fast speed. The master immediately realised that a collision was imminent, and reduced the engine throttle to zero. Moments later, the RIB's driver saw the passenger vessel and turned the steering wheel to port and then to starboard, causing the RIB to swerve violently. Seconds later, the RIB collided with the passenger vessel's port bow and both of the RIB's owners were thrown overboard.

Lifebuoys were quickly thrown from the passenger vessel towards the RIB's owners, who were then pulled to the vessel's side by passengers using the lifebuoys' lines. The now empty RIB continued to turn to starboard at a fast speed until it hit and ricocheted off a stone buttress of a nearby bridge. The RIB then circled back into mid-stream and collided with the passenger vessel for a second time, this time amidships on her port side. It then passed close to her two owners in the water before turning towards the riverbank and grounding. The RIB's owners were soon recovered by nearby vessels (see figure). Neither of the owners was wearing a lifejacket or a buoyancy aid, and neither was aware of the location of the accident.

Both of the RIB's owners smelled of alcohol; the driver failed an alcohol breath test shortly afterwards.

CCTV still - owners being approached by nearby vessel

The Lessons

1. Alcohol impairs performance and, more often than not, results in a greater willingness to take risks. The principle of a designated driver limiting their alcohol consumption is a sensible precaution, and one which is just as relevant to the drivers of water craft as it is to motorists.

2. The time taken to react effectively to the unexpected is reduced the faster a boat travels. Getting on the plane is fun, but it is not always sensible, particularly when navigating on a busy river in the dark.

3. A RIB driver does not expect to be thrown from his or her boat, and therefore it is not difficult to see why some drivers might consider the wearing of kill-cords as unnecessary, or even an insult to their ability. However, the unexpected does happen, and in this case the boat's owners were extremely fortunate not to be hit and seriously injured by their own boat as it circled.

4. Without lifejackets or buoyancy aids the RIB's owners were very lucky that help was immediately at hand. Had it not been, their chances of being recovered from the river would have been reduced considerably.

High Adrenalin Sport Needs Careful Thought

Narrative

Fourteen boats were competing in a national offshore circuit powerboat race in a harbour on the south coast. The crews were enjoying the race and the weather conditions were good. Towards the end of the first heat, one boat 'hooked' in turbulent water as it rounded a turning mark. It lost speed and turned sharply.

The boat following behind did not have much time to take avoiding action and, despite the driver's attempts, collided. The boat was launched into the air, rolled over and hit the water. Its crew escaped with minor injuries.

The co-driver of the boat that had hooked was not so lucky. He bore much of the force of the impact, his helmet was ripped off and he suffered severe injuries to his head and upper body. The safety crews were on scene extremely quickly and two medics worked to stabilise the co-driver's airway. The situation was bad and the boat was towed to the beach and man-handled ashore.

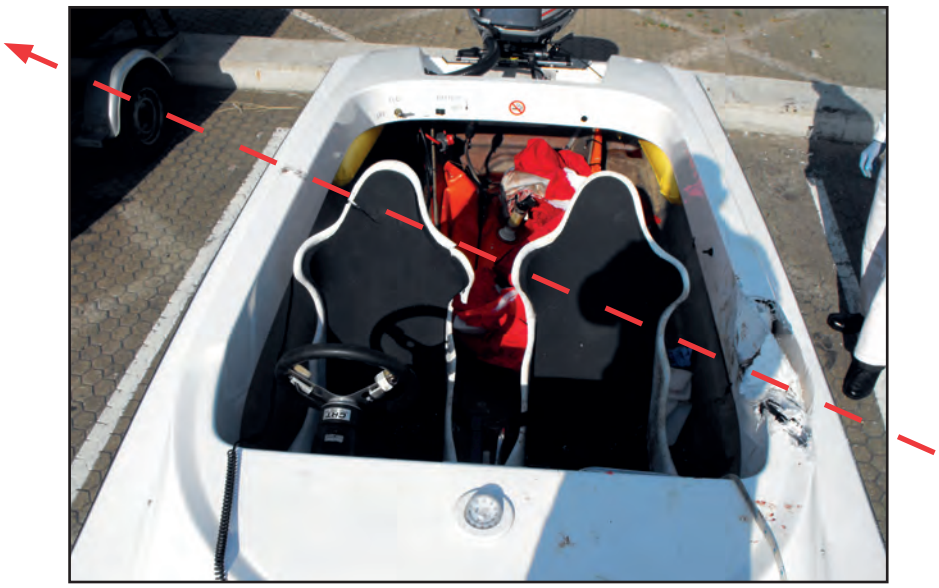
Race officials had called the emergency services, and an ambulance was waiting to meet the injured co-driver. A second ambulance and a helicopter emergency medical team also came to assist. Despite their efforts, the co-driver could not be saved and was pronounced dead about 90 minutes after the collision occurred.

Powerboat racing is a high risk sport; all the competitors acknowledged this when they entered the race. However, it is difficult to quantify how much risk should be tolerated. In this tragic case, it was the co-driver's first ever race. Many of the crews were competing in their first or second season and few had done any training to prepare them for the difficulties or risks of racing a powerboat. The boats were simple designs - attractive in keeping costs low, but offering little protection to the crew in a collision.

Little had been done to consider the overall safety of races, or copy better practices from other racing classes. The result was that there were many additional hazards in the race that could have been avoided.

Impact damage to port side cockpit coaming

View looking at point of impact and showing 'driver' leaning forward



Approximate direction of travel of other boat as it crossed the casualty's boat

The Lessons

1. There is no reason why high speed racing events should have a high level of risk. Comprehensive risk assessment and course planning ahead of any event should be used to reduce the overall risk to competitors and the public.

2. Training is essential in order that competitors can be equipped with the knowledge, instincts and reflexes needed to recognise and avoid dangerous situations in high risk sports.

3. Think creatively; there are many different ways to control hazards, and they do not automatically mean that competitors have less fun. Other activities might have already encountered - and solved - a similar problem; do not be shy about copying good ideas.

Sliding Canopy Injures Boat Hirer

Narrative

A boat hirer received head and neck injuries when he was struck by the sliding canopy roof of an inland waterway hire boat, which suddenly slid open.

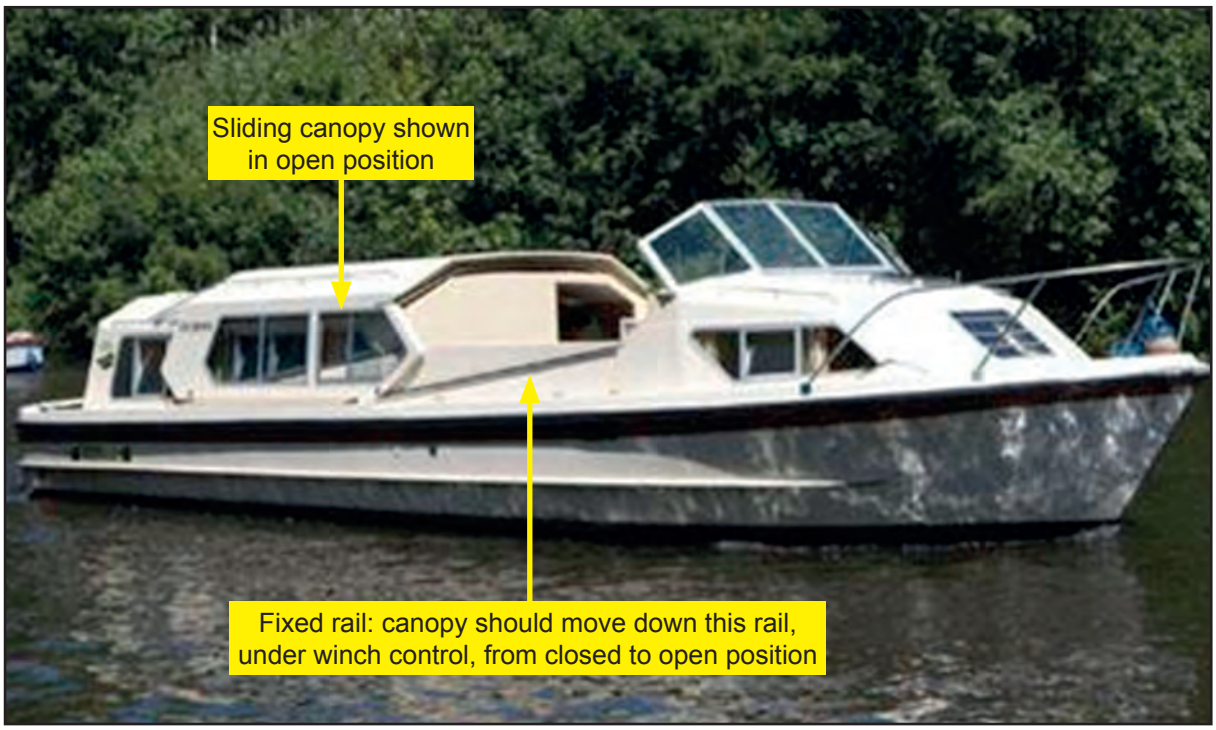


Figure 1: The vessel

The canopy had been in the closed position, forming the roof of the craft's cockpit, and the man had attempted to open the canopy by winding the winch operating handle in the downward direction. But the canopy remained closed.

Figure 2: Winch operating handle

The man left the winch handle slack and was facing aft when the canopy suddenly and rapidly slid open. As it did so, a light fitting on the underside of the canopy struck him on the back of his head. He was then lifted off his feet as his head and shoulders became trapped between the canopy roof and the aft bulkhead of the cockpit.

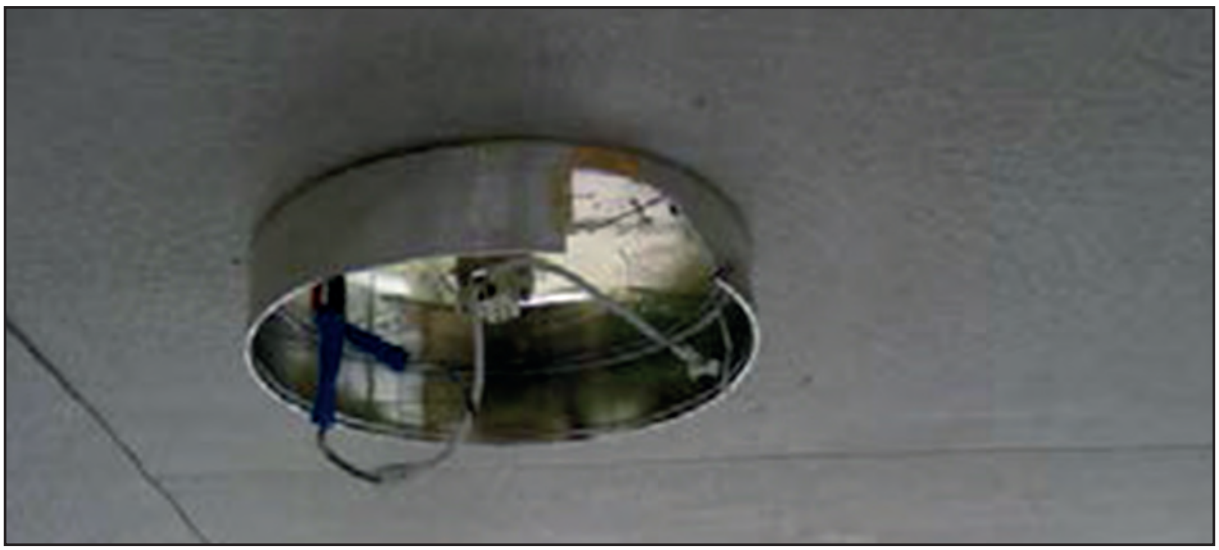


Figure 3: The light fitting

Fortunately, other members of the hire party were able to free the man by lifting the canopy off him and then summoning medical assistance. The man was taken to hospital having suffered concussion and lacerations to his head and shoulders.

Figure 4: The injured person suffered lacerations to the head and shoulders when struck by the light fitting and then trapped by the canopy

Investigation of the accident revealed that the winch handle had been modified, contrary to the manufacturer's recommendations, and it was concluded that this might have adversely affected the operation of the winch which held the wire used to raise and lower the canopy.

The Lessons

1. Boat owners and hire companies should follow equipment manufacturers' instructions and guidance when maintaining equipment. If the manufacturers' instructions indicate that parts should not be altered, those instructions should be followed.
2. At the handover briefing, the hire company should ensure that the hirer is given a demonstration of the operation of any bespoke or unusual equipment. In this case, the importance of keeping non-essential personnel clear of the cockpit area when the canopy is raised or lowered should also have been emphasised.

Investigations started in the period 01/03/13 – 31/08/13

Date of Occurrance	Name of Vessel	Type of Vessel	Flag	Size (gt) (m)	Type of Occurrance
14/08/2012	*Jean Elaine*	Dive tender	Not registered	21.88m	Accident (1 fatality)
21/02/2013	*Achieve*	Fishing vessel | Potter	UK	10.24m	Foundering (1 fatality)
26/02/2013	*Douwent*	General cargo	UK	1,311gt	Grounding
16/03/2013	*Danio*	General cargo	Antigua and Barbuda	1,499gt	Grounding
19/03/2013	*CMA CGM Florida* *Chou Shan*	Container ship bulk carrier	UK Panama	54,309gt 91,166gt	Collision Collision
01/04/2013	*Arniston*	Recreational craft / motorboat	UK	8.70m	Accident (2 fatalities)
25/04/2013	*Speedwell*	Fishing vessel / trawler / stern	UK	8.70m	Foundering (1 fatality)
25/04/2013	*Celtic Carrier*	General cargo	UK	2,565gt	Fire
05/05/2013	*Milly*	Recreational craft / motorboat	UK	8.00m	Accident (2 fatalities)
15/05/2013	*Tyrusland*	Ro-Ro cargo	UK	20,882gt	Occupational accident (1 fatality)
14/06/2013	*Fri Ocean*	General cargo	Bahamas	2,218gt	Grounding
15/06/2013	*Wacker Quacker 1*	Amphibious craft	UK	9.95m	Foundering
22/06/2013	*Sirena Seaways*	Passenger and ro-ro cargo	Denmark	22,382gt	Contact
25/07/2013	*Apollo*	Oil tanker/ product carrier	Gibraltar	16,914gt	Contact
05/08/2013	*Prospect*	Fishing vessel | trawler	UK	20.62m	Grounding
18/08/2013	*Isamar*	Motor yacht	UK	23.98m	Grounding

APPENDIX B

Reports issued in 2013

ACX Hibiscus **and** ***Hyundai Discovery*** - collision in the approaches to the eastern Singapore Strait TSS at 0756 local time on 11 December 2011
Published 19 June

Alexander Tvardovskiy - collision in Immingham on 1 August 2012
Published 31 May

Amy Harris III - engine room fire, south of the Isle of Arran on 16 January 2013
Published 23 August

Beaumont - grounding on Cabo Negro, Spain on 12 December 2012
Published 14 June

Betty G - capsize while beam trawling in Lyme Bay on 23 July 2012
Published 7 February

Carrier - grounding of the cargo ship at Raynes Jetty in Llanddulas, North Wales on 3 April 2012
Published 22 May

Coastal Isle - grounding of the container vessel on the Island of Bute on 2 July 2012
Published 30 May

Denarius - fire and abandonment of fishing vessel 83 miles NNE of Kinnaird Head on 9 July 2012
Published 6 February

E.R.Athina - fatal injury to a crew member on a platform supply ship while at anchor off Aberdeen on 10 June 2012
Published 23 January

Heather Anne - capsize and foundering of fishing vessel in Gerrans Bay, Cornwall on 20 December 2011, resulting in the loss of one crewman
Published 10 January

Purbeck Isle - foundering of fishing vessel 9 miles south of Portland Bill, England on 17 May 2012, resulting in the loss of her three crew
Published 2 May

Sarah Jayne - capsize and foundering of the fishing vessel, with the loss of one life 6nm east of Berrry Head, Brixham on 11 September 2012
Published 13 June

Seagate **and** ***Timor Stream*** - collision 24 nautical miles north of the Dominican Republic on 10 March 2012 at 0540 local time
Published 26 June

St Amant - loss of a crewman from a fishing vessel off the coast of north-west Wales on 13 January 2012
Published 9 January

Swanland - structural failure and foundering of the general cargo ship in the Irish Sea on 27 November 2011 with the loss of six crew
Published 12 June

Timberland - man overboard in the North Sea on 25 November 2012
Published 7 June

Vidar - fatal man overboard from the trawler, off Milford Haven on 28 January 2013
Published 16 August

Vixen - foundering of the small passenger ferry in Ardlui Marina, Loch Lomond on 19 September 2012
Published 20 June

Wah Shan - fatal injuries to a crewman while securing a tug's tow wire on board, River Humber, on 2 October 2012
Published 17 July

Zenith - fatal man overboard from a fishing vessel 29 miles south-east of Kilkeel on 29 January 2012
Published 24 January

Safety Digest - published 1 April
MAIB Annual Report - published 31 July

Safety Bulletins issued during the period 01/03/13 to 31/08/13

MAIB SAFETY BULLETIN 1/2013

Ejection of family of six from an 8.0m RHIB in the Camel Estuary leading to two fatalities and serious injuries to two people

Marine Accident Investigation Branch
Mountbatten House
Grosvenor Square
Southampton
SO15 2JU

MAIB SAFETY BULLETIN 1/2013

This document, containing safety lessons, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch is carrying out an investigation into the ejection of a family of six from a RHIB on 5 May 2013. The unmanned RHIB subsequently executed a series of tight high speed turns, running over members of the family in the water, causing two fatalities and serious injuries to two people.

The MAIB will publish a full report on completion of the investigation.

Steve Clinch
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.maib.gov.uk
Press Enquiries: 020 7944 6433/3387; Out of hours: 020 7944 4292
Public Enquiries: 0300 330 3000

BACKGROUND

At approximately 1549 (BST) on Sunday 5 May 2013 a family of two adults and four children were ejected from their 8.0m rigid hulled inflatable boat (RHIB) into the water. They were manoeuvring the boat at speed in the Camel Estuary near Padstow, Cornwall, UK.

Some members of the family were subsequently run over by the RHIB, leading to the death of the father and the 8 year old daughter and serious injuries to the mother and the 4 year old son.

INITIAL FINDINGS

At this early stage in the investigation, the mechanism that led to the family being ejected from the RHIB into the water, is not clear.

The RHIB was fitted with a kill cord **(Figure 1)**, but this was not attached to the driver at the time of the accident. Consequently, when the driver was ejected from the boat, the kill cord did not operate to stop the engine and the RHIB continued to circle out of control, and at speed. As the RHIB circled, it ran over the family in the water a number of times, leading to the deaths and injuries. A few minutes later a local boatman was able to board the RHIB and bring it under control before further people were hurt.

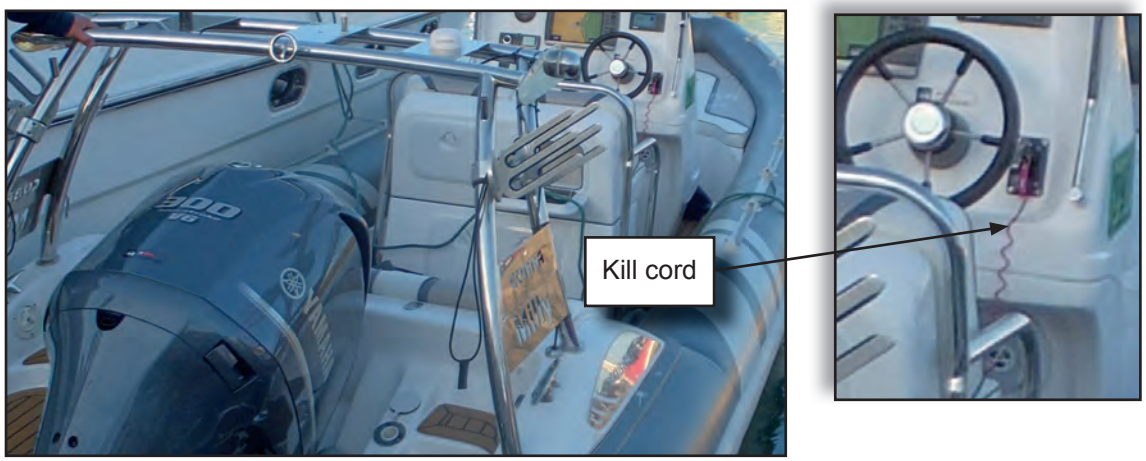


Figure 1: Boat with kill cord in place

SAFETY LESSON

The kill cord serves only one purpose, to stop the engine when the driver moves away from the controls. To ensure that this tragic accident is not repeated it is essential that all owners and operators of vessels fitted with kill cords:

- Test them regularly to ensure that the engine stops when the kill cord mechanism is operated.
- Make sure that the cord is in good condition.
- Always attach the cord securely to the driver, ideally before the engine is started, but certainly before the boat is put in gear.
- Stop the engine before transferring the kill cord to another driver.

Further information regarding the use of kill cords can be found at http://www.rya.org.uk/go/killcord

Issued May 2013

MAIB SAFETY BULLETIN 2/2013

Carbon monoxide poisoning on board the
Bayliner 285 motor cruiser *Arniston*
on Windermere, Cumbria
resulting in two fatalities

Marine Accident Investigation Branch
Mountbatten House
Grosvenor Square
Southampton
SO15 2JU

MAIB SAFETY BULLETIN 1/2013

This document, containing safety lessons, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch is carrying out an investigation into the deaths of two persons on board the motor cruiser *Arniston* on 1 April 2013.

The MAIB will publish a full report on completion of the investigation.

Steve Clinch
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.maib.gov.uk
Press Enquiries: 020 7944 6433/3387; Out of hours: 020 7944 4292
Public Enquiries: 0300 330 3000

APPENDIX C

BACKGROUND

A bank holiday weekend on board an 11 year old Bayliner 285 motor cruiser ended tragically when a mother and her 10 year old daughter died. Initial findings indicate the deceased were poisoned by carbon monoxide.

INITIAL FINDINGS

A "suitcase" type portable petrol-driven generator (Figure 1) had been installed in the motor cruiser's engine bay to supply the boat with 240v power. The generator had been fitted with an improvised exhaust and silencer system which had become detached from both the generator and the outlet on the vessel's side (Figures 2 and 3). As a result, the generator's exhaust fumes filled the engine bay and spread through gaps in an internal bulkhead into the aft cabin where the mother and daughter were asleep. When the owner of the boat awoke in the boat's forward cabin, he was suffering from carbon monoxide poisoning but was able to raise the alarm. The mother and daughter could not be revived.

The boat's carbon monoxide sensor system did not alarm because it was not connected to a power supply.

Figure 1

Figure 2

APPENDIX C

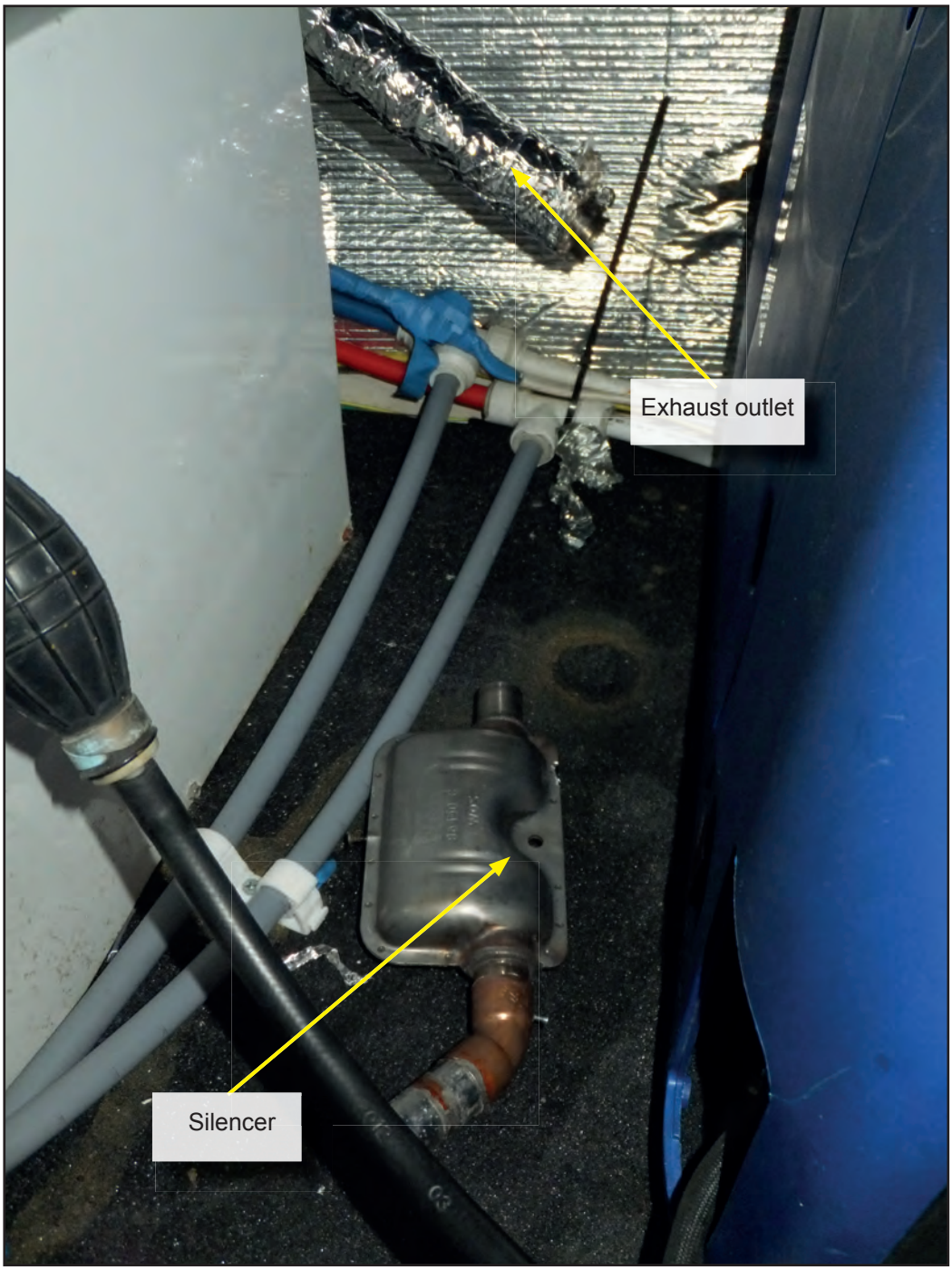


Figure 3

SAFETY ISSUES

1. Portable air-cooled petrol generators are readily available and inexpensive, but they are usually intended for use in the open air. The use or permanent installation of these engines on boats, particularly in enclosed spaces or below decks, increases the risk of carbon monoxide poisoning.

2. It is essential that engine exhaust systems are fitted and maintained to direct poisonous fumes outside the vessel clear of ventilation intakes and accommodation spaces. Work on these systems should therefore only be undertaken by suitably qualified marine service engineers using approved parts and following the equipment manufacturer's instructions for marine installations.

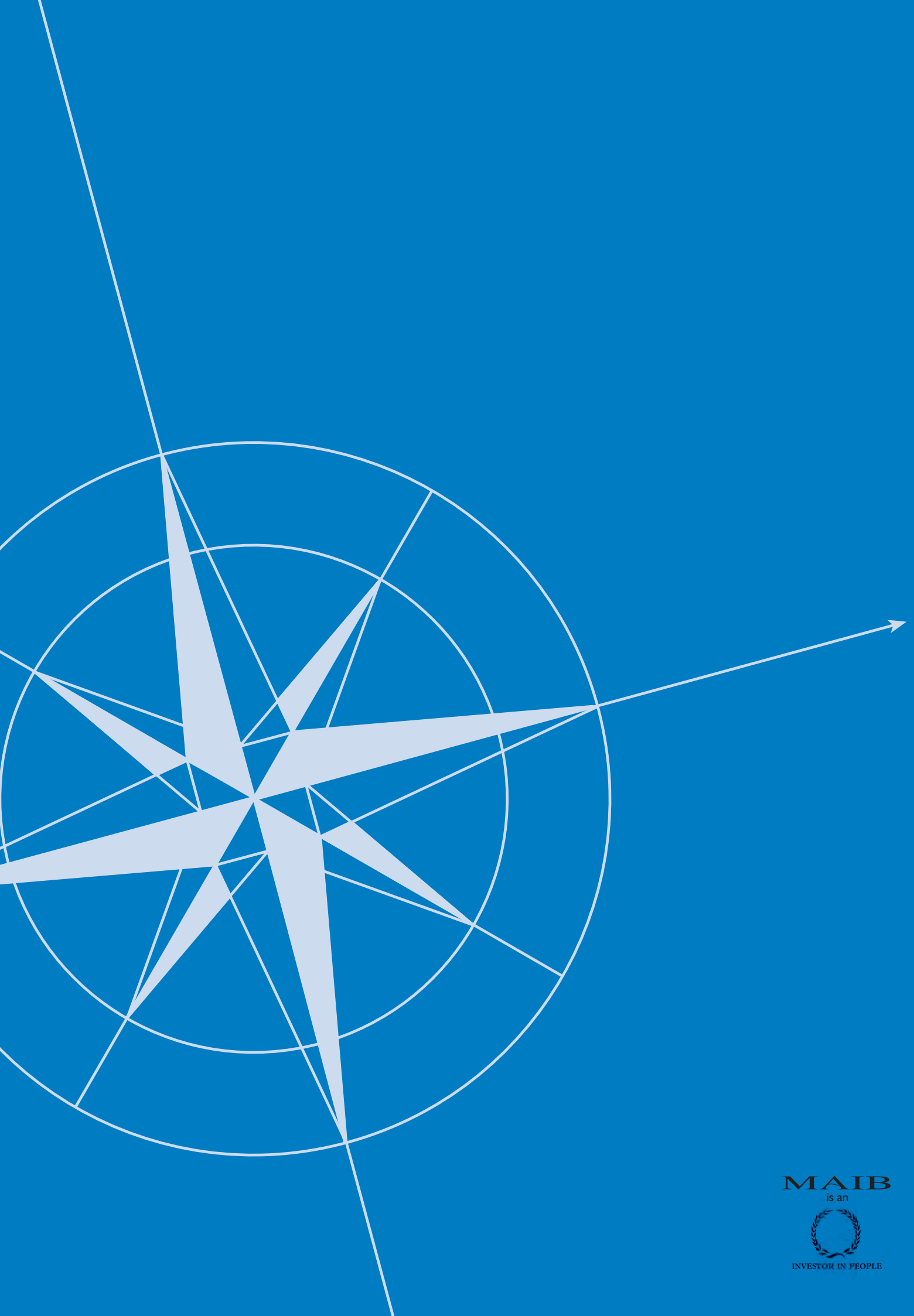
3. Carbon monoxide is a lethal gas, which has no smell, no taste, is colourless and is extremely difficult for human senses to detect. All boaters need to be vigilant and recognise the signs of carbon monoxide poisoning, which can include: headaches, dizziness, nausea, vomiting, tiredness, confusion, stomach pain and shortage of breath.

4. Carbon monoxide is a silent killer that is just as lethal afloat as it is ashore. The correct positioning and the regular testing of any carbon monoxide sensors, whether powered by a boat's electrical supply or self-contained, is essential. Carbon monoxide sensor alarms that do not work correctly should be replaced. When selecting a carbon monoxide alarm preference should be given to those marked as meeting safety standard EN 50291-2:2010 which are intended for use in a marine environment.

   Further advice on how to avoid carbon monoxide poisoning on boats and more detail about carbon monoxide alarms, produced by the Boat Safety Scheme (BSS) and the Council of Gas Detection and Environmental Monitoring (CoGDEM), can be found at:

   http://www.boatsafetyscheme.org/stay-safe/carbon-monoxide-(co)

Issued May 2013



MAIB
is an
INVESTOR IN PEOPLE